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(Assisted by several Scientific Gentlemen.)

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X. Devaux's Apparatus for preventing the Explosion of Steam Boilers.

XI. Chappé's Apparatus for Consuming Smoke; Haden's Gig Mill; Doe's Improved Soap Frame; and Mallett's Hot Oil Lamp.

XII. Osborne's Cork-screws; Arter's Improved Tap; and Watson's Machinery for Crushing Flax.

XIII. Wordsworth's Heckling Machinery; Dickenson's Paper Making Machinery; and Smith's Machinery for Joining and Rivetting Boiler Plates.

XIV. Stead's Wood Paving; Hodgson's Wood Paving; Geary's Wood Paving; Carey's Wood Paving; Brown's Paving; Vandeleur's Improvements in Paving; and Ramee's Improvements in Paving.

XV. Drew's Apparatus for Consuming Smoke, and Hanson's Improvements in Making Pipes.

XVI. Webb's Improved Machinery for Dressing Cloth.

XVII. Philcox's Chronometers, and Newton's Sun Dials.

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No. XCVIII.

Recent Patents.

To MILES BERRY, *of the Office for Patents*, 66, *Chancery-lane, in the county of Middlesex, patent agent, for an invention of* a new or improved method of obtaining the spontaneous reproduction of all the images received in the focus of the camera obscura,—*being a communication from a foreigner, residing abroad.*—[Sealed 14th August, 1839.]

AFTER the usual preamble of a specification, the patentee has, in this instance, thought proper to make the following preliminary observations:—

This invention or discovery relates to photogenic drawing, or the spontaneous reproduction of images, pictures, or representations of nature, by the action of light, that is, by the process or method now well known under the name of "DAGUERREOTYPE." I believe it to be the invention or discovery of Messrs. Louis Jacques Maude Daguerre

and Joseph Isidore Niepce, junior, both of the kingdom of France, from whom the French Government have purchased the invention for the benefit of that country.

This invention or discovery was fully communicated to me by a certain foreigner, residing in France, on or about the 15th day of July, in the year 1839, with instructions, immediately, to petition Her Majesty to grant her royal letters patent for the exclusive use of the same within these kingdoms; and, in consequence thereof, I did apply for such letters patent; and Her Majesty's Solicitor-General, after hearing all parties who opposed the same, was pleased, on or about the 2nd day of August, now last past, to issue his report to the Crown in favor of the patent being granted, and it consequently passed the Great Seal in the usual course, being sealed on the day above named, which is some days prior to the date of the exposition of the said invention or discovery to the French Government, at Paris, by Messrs. Daguerre and Niepce, according to the terms of their agreement. And I will now proceed to describe this invention or discovery, as communicated to me.

Description of the process.—The reproduction of the images, received at the focus of the *camera obscura,* is effected on plates, or surfaces of silver, which may be plated on copper. The copper serving principally to support the surface or sheet of silver,—the combination of these two metals contributing towards the perfection of the effect. The silver employed should be without alloy, or as pure as possible. The sheet of copper should be sufficiently thick to preserve the perfect smoothness and flatness of the plate, so that the images may not be distorted by the warping thereof; but the copper should not be thicker than what would be required to attain that end, on account of the weight of the metal. The thickness of the two metals united, need not exceed that of a stout card.

The process is divided into five operations:—The first consists in polishing and cleaning the silver surface of the plate, in order to properly prepare or qualify it for receiving the sensitive layer or coating, upon which the action of the light traces the design. The second operation, is the applying that sensitive layer or coating to the silver surface. The third, in submitting in the camera obscura the prepared surface or plate to the action of the light, so that it may receive the images. The fourth, in bringing out or making appear the image, picture, or representation, which is not visible when the plate is first taken out of the camera obscura. The fifth and last operation, is that of removing the sensitive layer or coating, which would continue to be affected and undergo different changes from the action of light;—this would necessarily tend to destroy the design or tracing so obtained in the *camera obscura.*

Description of the first operation—preparing the silver surface of the plate.—For this operation are required a small phial of olive oil, some cotton, very finely carded, a small quantity of pounce or pumice powder, ground extremely fine, and tied up in a small bag of muslin, sufficiently thin in texture to allow the powder to pass easily through when the bag is shaken.—A phial of nitric acid, diluted with pure water in about the proportion of one part of acid to sixteen parts of distilled water.—A wire frame or stand, on which the plates can be placed, so as to be heated by means of a lamp. Lastly, a spirit or other lamp to heat the plates. The size of the plates or surfaces are limited by the dimensions of the apparatus.

The plates must first be well cleaned and polished. To effect this, begin by sprinkling the silver surface with pounce, by shaking the bag, without touching the plate, and then with cotton, impregnated with a little olive oil, rub it gently on, lightly moving the hand round in circles

from the centre c. (see Plate I., fig. 2.) The plates, during this operation, should be placed flat on a sheet of paper, which must be changed when necessary. The pounce must be sprinkled several times, and the cotton changed several times, during the operation of rubbing.

The pestle and mortar used for pulverizing the pounce or pumice powder, should not be formed of either cast iron or copper, but made of porphyry. The pounce should be ground afterwards on a glass plate, with a glass muller, pure water being used in the operation. The pounce should be used only when perfectly dry.

It will readily be conceived how important it is that the pounce or pumice powder should be sufficiently finely pulverized, so as not to cause streaks; for it is, in a great measure, upon the fine polish of the surface of the plate that depends the beauty of the image, picture, or tracing produced thereon.

When the plate is perfectly polished, it must then be cleaned:—this is effected by dusting or sprinkling the powder over the surface, and rubbing it with dry cotton, the movements of the hand being made in circles, and backwards and forwards, and up and down, crossing each movement, in order to operate equally on all parts of the surface. This is the best mode of rubbing to gain the desired result.

Next, a small knot or tuft is made with carded cotton, which is to be moistened with a little acid diluted in water, as above stated. To do this, the knot of cotton may be placed on the mouth of the bottle containing the diluted acid, and pressed thereon; the phial being then inverted, and then placed again upright, so that the centre of the tuft of cotton may be moistened with acid without deeply impregnating it. Very little acid is required, and care must be taken not to wet the fingers with it. With this tuft,

so charged with acid, the surface must be rubbed, care being taken to carry the acid uniformly over all parts of the surface of the plate; the cotton should be changed several times, and the rubbing of the surface be made by moving the hand round and round, and crossing as before, so as to extend, equally, the acid; which, nevertheless, ought to do no more than cover, slightly, the surface of the plate. It will sometimes happen that the acid applied on the surface of the plate will be found to accumulate into small globules,—these must be destroyed by changing the cotton, and by rubbing the plate gently, so as to spread the acid evenly; for, on any place where the acid has been allowed to rest a time, or has not been laid evenly, it would form spots or stains.

It will be seen that the acid is evenly spread upon the surface of the plate, by its appearing covered with a uniform tint, or what may be termed a thin veil or change of surface. The plate is finally to be sprinkled with pounce or pumice powder, and cleaned by slightly rubbing it with a fresh piece of carded cotton. Instead of ordinary pounce, calcined Venetian tripoli may be used.

The plate, thus prepared, is then to be submitted to a considerable degree of heat. To do this, it is placed on a wire frame, such as shewn in Plate I., at figs. 1 and 2, the silver surface being uppermost. Under the plate is placed a lighted lamp, which is to be moved about, so that the flame shall act equally upon all parts. When the plate has been submitted to this operation for about five minutes, (or until the heat has acted equally upon all parts of the plate,) it will be perceived that the surface of the silver has obtained a whitish tint or coating, and then the action of the heat must cease.

This effect may be obtained by other means; for instance:—The heat of lighted charcoal may be used, which

may be preferable, as the operation will be sooner finished. In this case, the wire frame is unnecessary, for the plate may be laid on the stove, or held with tongs, the silver surface always being upwards, and it may be moved backwards and forwards on the furnace, so as to heat it equally throughout, until the silver surface becomes covered with a whitish tint, as above stated. The plate is next to be cooled rapidly by placing it on a cold body or subtance, such as a marble slab, or stone, or metal surface. When cooled, it must be polished again. This may be quickly done, since it is only necessary to remove the white tint which has been formed on the silver surface. To effect this, the plate is to be sprinkled with pumice powder, rubbed, in a dry state, with a portion of cotton. This should be done on the surface of the plate several times, taking care to change the cotton often.

When the silver is well polished, it is to be rubbed, as above stated, with acid dissolved in water, and sprinkled with a little dry pounce powder, and rubbed lightly with a knot of cotton. The acid is then to be laid upon the plate, say three different times, care being taken to sprinkle, each time, the plate with powder, and to rub it dry, and very lightly, with clean cotton. Care should be taken not to breathe upon the plate or to touch it with the parts of the cotton touched by the fingers, as the perspiration would produce spots or stains; and dampness of the breath, or of the saliva, would produce the same defects in the drawings.

When the plate is not intended for immediate use or operation, the acid may be used only twice upon its surface, after being exposed to heat. The first part of the operation may be done at any time. This will allow of a number of plates being kept prepared up to the last slight operation. It is, however, considered indispensable, that

just before the moment of using the plates in the camera, or the reproducing the design, to put, at least once more, some acid on the plate, and to rub it lightly with pounce, as before stated.

Finally,—the plate must be cleaned, with cotton, from all pounce dust which may be on the surface or its edges.

Second operation.—For this operation the following implements are required:—The box, represented in figs. 3 and 4; the thin board or frame, shewn in fig. 5; four small metallic bands, of the same metals as the plates, seen also in fig. 5; a small handle, and a box of small nails or tacks; and a phial of iodine.

After having fixed the plate upon the thin board or frame, (the silver surface uppermost,) by means of the metallic bands, and the small nails which are forced into the board by the handle, some iodine is then to be put into the cup or dish D, placed in the bottom of the box, figs. 3 and 4. It is necessary to divide the iodine into pieces, in order to render the exhalation more extensively and equally diffused; otherwise, on the middle of the plate would be formed circles, or a kind of *iris*, or appearance of a rainbow, in prismatic colours, which would prevent the plate from receiving an uniform impression.

The thin board, with the plate, is then placed, with the silver surface undermost, upon small brackets or supports, at the four angles of the box; its cover G, is then closed. In this position, the plate must be left until the surface of the silver be covered with a fine golden tinge, which is caused by the evaporization of the iodine condensing on the surface of the silver. If the plate were allowed to remain too long, this golden yellow colour would turn purple, or violet colour, which must be avoided, because, in this state, the coating is not so sensitive to the effect of light. On the contrary, if this coating is too pale, or not

sufficiently yellow, the image taken from nature would be very deficiently or faintly reproduced; therefore, a coating of a golden yellow is particularly desired, because it is the most favorable to the production of the effect.

The time necessary for this operation cannot be stated, because it depends on several circumstances; one is, the temperature of the room wherein the operation is conducted; another, the state of the apparatus, which, for this process, should be left to itself, and not be affected by the addition of any other heat than that of the room.

It is very important, in this operation, that the temperature inside the box be equal to that outside; if such were not the case, on the plate being passed from a cold to a warmer atmosphere, it would become covered with condensed moisture from the atmosphere, which would do great injury to the effect. This operation should be left entirely to the spontaneous evaporation of the iodine. Also, the more this box or apparatus is used, the less time is required to effect the object, because the interior sides of the box become penetrated with vapour of iodine; and as it is the nature of this vapour always to evaporate, it will arise from all the internal parts of the box, and, therefore, will spread more evenly and more quickly on the surface of the plate, which is very important; therefore, it is proper to leave a little iodine in the cup on the bottom of the box, and also to keep the box free from damp. It is, therefore, evident that the apparatus will operate better after being used several times.

From the causes above stated, it is not possible to fix, precisely, the time necessary for obtaining the coating of a golden yellow tint, as the same may vary from five to thirty minutes, but rarely longer, unless the weather be very cold. It is necessary to look at and examine the state of the plate, from time to time, to ascertain whether

it has attained the golden yellow tint required; but it is important that the light should not be allowed to fall or strike directly upon its silver surface. It may happen that the plate be more coloured or tinted at one end than at the other; in that case, in order to equalize the tint, care must be taken, in replacing the plate, to turn it endways, or side for side.

In order to accomplish these repeated examinations, without injuring the sensitive ground or coating, this process should be conducted in a darkened room, into which light is admitted sideways, not from the roof. The box should be placed in a dark room, where the light enters but feebly, as through the door left a-jar. Whenever the plate is to be inspected, the operator is to raise the lid of the box, when the board may be taken by its edges with the two hands, and turned up rapidly, very little light being required to shew the true colour of the coating; and if the plate has not obtained the golden yellow tinge, it must be immediately replaced in the box, and there kept until it attains the proper gold colour; if, on the contrary, the colour is deeper, then the coating will not be of any use, and the plate is to be repolished and cleaned,—the first operations being recommenced.

From a written description, this operation may seem difficult and tedious; but, with a little practice, an intelligent operator would be enabled to judge, accurately, of the time required to obtain the desired golden yellow tint; and also to inspect, rapidly, the plate, so as not to give the light sufficient time for acting upon the coating.

When the surface of the plate has attained the proper colour, the board, with the plate, must be introduced into the frame, represented at figs. 6, 7, and 8, which frame is adapted to the camera obscura. In this transferance, care must be taken to prevent the light striking on the surface

of the plate; and for this purpose, the camera obscura may be lighted with a wax taper, the light of which has much less effect upon the coated surface; even this light ought not to be allowed to strike too long on the plate, as it will cause marks or traces on the same, if allowed to continue a length of time.

After this second operation is completed, the plate is to be passed to the third operation, or that of the camera obscura. Whenever it is possible, the one operation should immediately follow the other; the longest interval between the two should not exceed an hour; beyond this time the action of the iodine and silver surface will lose their requisite photogenic properties. But, previous to passing to the third operation, I would add the following remarks or observations:—

First observation.—Before using the iodine box, the interior should be well cleaned, and the box itself turned upside down, in order to empty it of all the particles of iodine which may have escaped from the cup; care must be taken not to touch the iodine with the fingers.

During the operation of coating the surface with iodine, the cup should be covered with a wire or other gauze, stretched on a frame; this gauze has the effect of regularly distributing the evaporation or vapour of the iodine upon the surface of the plate, and at the same time to hinder, whenever the lid of the box is closed, the compression of air, thereby occasioned, from causing the particles of iodine to be scattered or flying about within the box, which particles might strike the plate and cause spots or blotches thereon; for this reason, the lid of the box should always be closed quietly. The same observation applies in case particles of dust should rise inside the box, which, being charged with the vapour of iodine, might injure the plate by coming in contact with its surface.

Second observation.—The iodine box or apparatus, above described, may be varied according to circumstances, or be substituted by the following contrivance:—A thin deal board, similar to the one used for fixing the plates upon, is first to be saturated with the vapour of the iodine; this may be done in a box similar to the one above described, or even in a box only two inches high. This board, when once properly saturated, may be placed in a small box, two inches high, of the proper length and width, and provided with three grooves or ledges, one to receive the metallic plate or silver surface, and the two others to receive the saturated board, which may be placed nearer to or further from the metallic surface. When placed in the first groove or ledge, it may be at a quarter of an inch distance from the plate; in the second, it may be at a distance of half an inch or more. This second groove or further position need only be used in case the operation of coating the surface should proceed too fast in consequence of increase of temperature, or in case the plate should have been withdrawn before it has reached its proper degree of golden colour.

This mode or process of coating the surface has the advantage of enabling the operator to coat the plate with iodine with great rapidity, that is to say, generally in a very few minutes. If the operation should proceed too fast, the board, saturated with iodine, may be placed in the upper groove, and the metallic plate underneath this position causes the operation to proceed slower. It is necessary that this iodine box should be securely closed to hinder any current of air reaching the surface; and, moreover, in this latter case, the box should only open on one of its sides.

The board, saturated with iodine, may be made to serve to coat several plates during a whole day, or even several

days, without the necessity of replacing it in the iodine saturating box. I will now proceed to describe the next operation.

Third operation—the camera obscura.—As before stated, the operation should proceed, as quickly as possible, from the second to the third operation, or not leaving more than one hour between both, as beyond this time the combination between the iodine and the silver has no longer the same property.

The apparatus necessary for this operation, is the *camera obscura,* (see figs. 9 and 2,) adapted and fitted to receive the prepared plates and their boards.

This third operation is that in which, by means of light acting through the lens of the camera obscura, nature reflects or impresses (to use figurative language) an image of herself of all objects enlightened by the sun on the surface of the photographic or prepared plates.

It is easy to conceive that this operation being produced only by the agency or effect of light, that the action is the more rapid according as the objects are more brilliantly lighted up, or illuminated, or in their nature are more intensely white, or present bright lines or surfaces.

After having placed the camera obscura opposite to, or in front of the objects of which it is desired to fix or retain the image, or obtain a representation, it is essential, first, to adjust the focus of the camera obscura, so that the objects may be represented perfectly clear and distinct; this is easily done by moving forward or backward the frame of a plate of ground glass in the camera, which glass receives the images of the objects from the lens. When this frame is brought to the proper position, this moveable part of the camera obscura is fixed by means of screws, applied for that purpose. The ground glass is then removed from the instrument, care being taken not to move

the camera obscura; and in the place of the ground glass is substituted the apparatus, carrying the prepared metallic plate or surface, (see figs. 6, 7, and 8,) which apparatus exactly fits the place of the ground glass plate or its frame. During the time the apparatus, with the prepared surface, is being fastened by small brass buttons or other fastenings, the camera obscura is closed. The obscuring shutters or doors B, B, of the apparatus are then opened by means of the two semi-circles A, A. The plate is then in a proper position to receive and retain the impression of the image of the objects chosen,—nothing more need be done but to open the aperture of the camera obscura, and to consult a watch to reckon the minutes the prepared surface shall be under the action of the light.

This operation is of a very delicate nature, and should be carefully attended to, because nothing is visible, and it is quite impossible to state the time necessary for the reproduction of the image, as it depends entirely on the intensity of light received by, or from the objects, the image of which it is intended to reproduce; the time may vary from three to thirty minutes.

It must likewise be remarked, that the seasons as well as the hours of the day have great influence on the rapidity of the operation. The most favourable hours are from seven in the morning till three in the afternoon. The process of reproduction, which may requre from three to four minutes in the months of June and July, will require from five to six in the months of May and August, from seven to eight in April and September, and so on in proportion as the seasons advance. This is only a general and approximate statement, for objects strongly lighted, as it often happens, that twenty minutes are necessary for the operation in the most favourable months, that is, when the objects are partially in shadow or darkness.

It will be seen from what has been stated, that it is impossible to name, exactly, the time necessary for obtaining images or tracings from nature, (or photographic designs); but, by a little practice, it may be easily ascertained. Practice is the only sure guide; and, with this advantage, an operator will readily ascertain the required time correctly. Latitude of the situation is of course to be considered:—for example, it is conceived, that in the south of France, and, generally, in all the countries where the light is very intense, as in Spain or Italy, the plates will receive the impression much more rapidly. It is, however, very important not to allow more time to pass than what is necessary for the reproduction, because the clear parts would no longer be, or remain white or clear,—they would be darkened by the prolonged action of the light allowed to strike upon the iodine on the surface. If, on the contrary, the time allowed is not sufficient, then the proof or image would be vague, and without proper details.

Supposing the operator has failed in one proof, it being imperfect on account of its having being withdrawn too soon, or left to remain too long, another may be begun immediately. If a plate has been previously prepared, the operator is then more certain of obtaining the proper effect, the second operation being connected by the first.

It is desirable and useful, in order to acquire a proper practice, to make some experiments of this kind. The plate or surface having been submitted to the action of the light the required time, I will proceed to describe the—

Fourth operation—the mercurial process.—The operator must hasten to submit the surface of the plate to the fourth operation as soon as it is withdrawn from the camera obscura. Not more than one hour ought to be allowed to expire between the *third* and fourth operations; and it is much more certain to obtain good proofs or tra-

cings of nature, when the fourth operation takes place *immediately after* the third.

For this fourth operation, the following articles are required:—First, a phial containing a quantity of mercury or quicksilver. Second, a spirit or other lamp. Third, the apparatus, represented in figs. 11 and 12. Fourth, a glass funnel, with a long neck. By means of the funnel, the mercury is poured into the cup C, situated in the bottom of the apparatus, (shewn in the figures,) and in a sufficient quantity to cover the ball or globe of the thermometer F. From this time no day-light must be admitted, and the room must be darkened, and the light of a candle or taper only be used to enable the operator to inspect the progress of the operation.

The board, on which the plate is fixed, must be withdrawn from the apparatus, already mentioned, as adopted in the camera; which apparatus preserves it from the contact of light. The thin board, with the plate, is then introduced in the grooves or ledges of the blackened board B, fig. 11. This black board is then replaced in the box or apparatus, where it is maintained at an inclination of forty-five degrees. The prepared metal surface H, being placed undermost, so that it may be seen through the side glass G, the cover A, of the box must be put down gently to prevent any particles of mercury flying about, in consequence of the compression of the air.

When the whole is thus prepared, the spirit lamp is lighted and placed under the cup containing the mercury, and allowed to remain until the thermometer (the ball of which is immersed in the quicksilver bath, the tube extending outside the box,) indicates a temperature of sixty degrees centigrade,—the lamp then must be removed. If the thermometer has rapidly risen, it continues to rise

even when the lamp is removed, but it should not be allowed to rise above seventy-five degrees centigrade.

The impression of the image of nature ***now actually exists on the plate, but it is not visible;*** it is only after several minutes of time has elapsed that faint tracings of the objects begin to appear, as may be readily ascertained by inspecting the operation, or looking through the glass, assisted by the light of a candle or taper, which must not be allowed to strike too long on the plate, because it would leave marks on the same. The plate should be left in the box until the thermometer has fallen to forty-five degrees, then the plate is to be taken out, and this operation is finished.

When the objects or articles, (the reproduction of the images of which it is intended to be produced) have been brightly illuminated, and the light has acted a little too long in the camera obscura, this fourth operation will be finished, even before the thermometer has gone down to fifty-five degrees; this effect may be perceived by looking through the glass G.

It is necessary, after each operation, to wipe or clean well the interior of the apparatus, in order to remove the slightest coating or layer of mercury which generally covers or adheres to it. The black board or frame B, must, likewise, be carefully wiped, that it may not retain any particles of quicksilver. When the apparatus is to be packed up for carrying it from place to place, the mercury which is in the cup must be poured into the phial; this is done by inclining the box, so as to let the mercury escape through the small cock E, at the side of the apparatus.

The picture or plate may now be inspected by means of a weak light, in order to ascertain whether the operation has succeeded or not. It may be taken from off the thin board by removing the metallic bands or straps, which

bands should be cleaned carefully, by means of pounce and a little water, from any iodine or mercury they may have received; this should be done after each plate has been operated upon.

It will be readily conceived that this cleaning is necessary, since not only these small bands are covered with a coating of iodine, but they have also received a portion of the tracing from nature.

The plate is then to be placed in a box, provided with a cover and grooves, until it can undergo the fifth and last operation. This operation need not be effected immediately, for the plate or sketch may be kept in this state for several months without undergoing any alteration, provided, however, it be not frequently inspected or exposed in the open day-light. I will now proceed to the last operation, viz., the—

Fifth operation—fixing the tracing delineation or picture.—The object of the fifth operation, is to remove from the surface or plate the coating of iodine, which otherwise, on its being exposed too long to the action of light, would continue to be decomposed, and would thereby destroy the picture or tracing.

For this operation the following articles are required:—First, water, saturated with sea salt, or a weak solution of hyposulphite of pure soda. Second, the apparatus, represented in figs. 13 and 14. Third, two troughs of tinned metal. Fourth, a vessel or jug, full of distilled water.

In order to remove the coating of iodine, the operator must take the common salt, and put it into a bottle with a large mouth, the bottle being filled with pure water. To accelerate the dissolving of the salt, the bottle may be shaken from time to time. When the water is completely saturated with salt, it is to be filtered through blotting

paper, that no extraneous matters may remain in it, and that it may be perfectly clean.

Water, saturated with salt, may be prepared in sufficient quantity beforehand, and kept in corked bottles; by this means, the necessity and inconvenience of preparing it every time is avoided.

Into one of the troughs the salt water is to be poured, until it is about an inch in depth; the other trough is to be filled with pure water. These two fluids are warmed or heated in temperature, though not to the boiling point.

In place of the solution of salt, may be substituted a solution of hyposulphite of pure soda; this latter is even preferable, because it completely removes the iodine, which is not always the case when salt is used, especially if the designs or tracings have been obtained some time, and laid aside between the fourth and fifth operations. The mode of operating, however, is the same for the two solutions, although the solution of hyposulphite does not require to be warmed, and a less quantity of it is required than of the salt and water, since it is sufficient that the plate should be covered with the same when laid on the bottom of the trough.

The plate is first to be immersed in the pure water contained in one of the troughs. It must only be dipped in and drawn out immediately; it is sufficient that the surface of the plate be covered with water, and then, without allowing it to dry, it is to be plunged immediately into the salt water.

If the plate is not dipped in pure water before immersing it in salt water, or in the solution of hyposulphite, these solutions would make marks or spots on the surface of the plate. To facilitate the action of the salt water, or of the hyposulphite which absorbs the iodine, the plate

should be moved about in the liquid, thus producing a gentle washing of the surface.

When the yellow colour or tint of the iodine is entirely removed from the surface of the plate, it is to be removed, and carefully taken by the edges, so as not to touch or injure the drawing, and then dipped immediately in the first trough of pure water.

The apparatus, shewn in figs. 13 and 14, is then brought into use, and must be perfectly clean, and a vessel filled with distilled water, which should be hot but not boiling. The plate, on being withdrawn from the trough of water, is to be placed immediately on the inclined plane E, and, without allowing it time there to dry, the operator is then to pour upon the surface, bearing the drawing, the hot distilled water, beginning at the top of the plate, and pouring the water over it in such manner that it shall flow over the surface and carrying away with it all the solution of sea salt, or of hyposulphite, which has been already considerably weakened by the immersion of the plate in the first trough. If hyposulphite solution has been used, the distilled water, to be poured over the surface, need not to be so hot as for the common salt solution.

Not less than a quart of hot distilled water is required for thus washing the surface of a plate, measuring eight or nine inches long by six or seven inches wide. It sometimes will occur, that after having poured warm water on the surface, some drops or globules of water will remain on the plate. In this case they must be removed before they have time to dry, as they might contain some particles of sea salt or iodine, and injure the drawings; they are readily removed by strongly blowing on the plate.

It will be understood how important it is that the water, used for this washing, should be perfectly pure, for part of it will dry on the surface of the plate, notwithstanding

the rapidity with which it may have passed over it; and if it contains extraneous matters, then numerous and indelible spots would be formed on the drawing or tracing.

In order to ascertain that the water is suited for this washing, a drop may be let fall on a burnished plate, and if, when evaporated by heat, it leaves no stain or mark behind, it may be employed without fear. Distilled water is always sufficiently pure for this operation, without testing.

When this washing is completed, the picture, drawing, or tracing, is finished. The only thing now to be done, is to preserve its surface from being touched, also from dust, and from vapours which tarnish silver. The mercury which traces the images, or, in other words, by the action of which the images are rendered visible, is partly decomposed,—it adheres to the silver,—it resists the washing by the water poured upon it, by its adhesion,—but it will not bear any rubbing or touching.

To preserve the drawings, they must be covered with glass, securely placed a little above the surface;—both the edges of the glass and plate secured by pasted paper or other means, and they are then unalterable, even by the light of the sun.

It may happen, that in travelling, the operator may not be able, conveniently, to thus secure the plates, but they may be preserved by inclosing them in a box; and for greater safety, small bands of paper may be pasted over the junction of the box and its cover.

It may be necessary to state, that the silver surfaces may be used several times, in succession, provided the silver be not polished or ground through to the copper. And it is very important to remove, after each time of using, the mercury traced on, or adhering to the surface, which is to be done, as before described, by means of

pounce or pumice powder and oil, and by changing the cotton often; otherwise the mercury would finally adhere to the silver, and the proofs obtained on that combination would always be imperfect, because they would be deficient both in vigour and clearness.

Explanations of the drawings (see Plate I.,) *of the apparatus used in these processes or operations of Daguerreotype.*—Fig. 1, represents a plan view of a wire frame; fig. 2, is a side view of the same. This frame serves to receive the plates when they are to be heated by the spirit lamp.

Fig. 5, is a plan view of the thin board or tablet, on which is fixed the plate for the subsequent operations. The plate is fixed on it by means of four thin metal bands, plated with silver,—they should be of the same thickness as the plate. These bands are fixed on the board by small nails, forced or driven into it through holes by means of a handle.

The surface of these bands, being nearly level with that of the plate, retain it by small projections or pieces soldered on them. These metallic bands have two offices to perform,—one to secure the plate, and the other to facilitate the equalization of the coat of iodine, which might otherwise be more intense on the edges or borders of the plate than on its centre.

Fig. 3, is a vertical section of the iodine box or apparatus, wherein the coating of iodine is obtained upon the silver surface. Fig. 4, is a plan view of the same. C, is an interior cover, closing the lower part of the box;—it serves, when the apparatus is not in operation, to concentrate the evaporation of the iodine, which condenses on the wooden surface of this part of the box; D, is the cup or dish for containing the iodine; E, is the thin board, to which is fixed the plate, (as represented at fig. 5,) the silver

surface being downwards; it is thus placed in order to obtain the coating of iodine, as the vapour therefrom rises upwards. The board rests on brackets F, placed at the four angles of the box, the cover C, being previously removed; G, is the lid or cover of the box, which should be kept shut, excepting when the plate is taken out for examination; H, H, are small rods at the four corners of the inclined lining K, of the box, to support the cover C; J, represents a disc or sieve of wire, or other gauze, which is to be placed over the cup, in order to equalize the dispersion of the evaporation of the iodine; it serves also to prevent, in case the box should be closed too rapidly, the compressed air from driving out of the cup particles of iodine which might adhere to the plate, and cause spots on the drawing; K, is the wooden lining, formed with inclined sides in the shape of a square funnel; this shape assists to diffuse equally the vapours of iodine, which spread as they rise.

It is requisite to have a magazine box or case and its cover, in which may be enclosed the plates or surfaces, before and after the drawings have been taken. The plates are introduced into and secured by small grooves on the insides, so that they cannot rub against one another, they being at the same time preserved from dust. By pasting strips of paper on the junctions of the cover and box, they may be preserved from all injurious vapours; but this is requisite only for plates or drawings completely finished, or in case the box should not close well.

Figs. 6, 7, 8, represent different views of the *frame* which receives the thin board carrying the plate or silver surface, and serves to preserve it from the effect of light as soon as it has received the coating of iodine in the box, shewn in fig. 3. Fig. 8, a front view, shewing the covers or doors to shade the silver surface. Fig. 6, is a section shewing

the doors in the position they will be in when the plate is exposed to the action of the light in the camera. A, A, are semi-circles or pieces for opening the doors B, whenever this frame, with the plate, is placed in the camera obscura; C, is the thin board on which the plate is fixed; D, D, are buttons on both sides of the frame to fasten the board on the doors; E, shews the thickness of the frame; F, is the plate or surface intended to receive the picture.

Fig. 6, represents the frame with the doors open, as they are at the time when a tracing is taken in the camera obscura.

The camera obscura process.—Fig. 10, is a vertical section, taken through a camera obscura, adapted for the process of Daguerreotype or photogenic delineation, furnished with a frame for carrying the plate of ground glass A. The distance this glass plate is to be from the object glass or lens, is the same as the distance at which the surface intended to receive the image is placed, with the frame and shading doors, as shewn in C, fig. 9, which figure is a horizontal section of the camera obscura. B, is a mirror for observing the effect of objects and selecting points of view; this mirror seems to enable the operator to choose the scenery, the image of which, is to be reproduced; it should be inclined about forty-five degrees to the horizon, by means of the rod L. In order to bring the objects precisely in the focus, the ground glass should be completely exposed, and the object looked at as reflected on the ground glass. The image of the object is easily brought into the proper focus, by moving forward or backward the sliding box D, taking hold of it at the bottom with both hands by the projections E, fig. 2, and forcing it to or from the operator.

When the focus is properly adjusted, the thumb-screw H, is turned to fix the parts in this position. The mirror

is kept closed by means of two hooks at F, which take into small eyes at G; the frame and ground-glass plate is withdrawn, and in its place is substituted the frame carrying the prepared plate or surface, which is so represented in fig. 2, with the shading doors B, open in the camera obscura. These doors should be internally lined with black velvet, as well as the sliding box D, to avoid all reflection of light.

The object glass is achromatic and periscopic, (the concave part must be outside of the camera obscura,) its diameter is about three and a half inches, and its focus about thirteen inches. A diaphragm is placed before the object glass, at a distance of about three and a half inches, and its aperture may be closed by means of a plate on a pivot.

This camera obscura reverses the objects from right to left, which is not of much consequence in a great number of cases; but if it is desired to have an image, drawing, or tracing, in the natural position of the object, a flat looking glass or mirror is to be placed on the outside beyond the aperture of the diaphragm, as at J, fig. 9, it being fixed by means of a screw at K. But as this arrangement of reflection occasions a loss of light, and injures the photogenic process, about one third more time must be allowed to obtain a tracing or drawing.

The mercurial process.—Fig. 11, is a vertical section of the apparatus, and fig. 12, a front elevation, shewing the thermometer. A, is the cover of the apparatus; B, the black board with grooves to receive the board H, carrying the silver surface or metallic plate; C, the cup containing the mercury or quicksilver; D, is the spirit lamp; E, is a small cock, through which the mercury may be withdrawn, the apparatus being inclined on one side for that purpose; F, is the thermometer; G, is a glass window, through which the progress on the silver surface may be inspected; H, is

the board carrying the metallic plate, which has received the image or design; I, is a stand or support for the spirit lamp, which is held by the ring K, so that the flame may play on the centre of the cup. All the interior parts of this apparatus ought to be blackened and varnished.

The washing apparatus.—Fig. 13, is a front representation of the washing apparatus, made of tin, varnished. To wash the designs on the plates, they are placed on the stand or angular ledge D, see fig. 13. E, is a ledge to conduct the water to the receptacle C. Fig. 14, is a side elevation of this washing apparatus.—[*Inrolled in the Rolls Chapel Office, February,* 1840.]

To JOHN DAY, *of York-terrace, Peckham, in the county of Surrey, gentleman, for his invention of an improved wheel for carriages of different descriptions.*—[Sealed 14th August, 1835.]

THE wheel described as the subject of this patent, appears to be principally designed for railways. It is made entirely of wrought iron, by welding together bars of about two inches broad by half an inch thick, in the manner shewn in Plate II.

Two bars of iron, cut to the required length, are bent at their ends, in the manner shewn at fig. 5. A diamond shape piece is then introduced between the bends, and the whole firmly welded together at the lower part in a mould, which will produce the shape represented at fig. 6. At the proper lengths, the top parts of the bars are thus bent back, as shewn by dots, and on being welded into the form, shewn at fig. 7, the part *a*, of which, is to produce one

spoke of the wheel, with a portion of the felloe *b, b,* and the spade shape *c,* at bottom, to constitute a segment of the nave.

As many of these portions, as are intended to constitute the wheel, are thus put together, as shewn at fig. 8, with a small triangular piece to fill up at *d,* and the scalf joints being welded, the wheel is formed.

An outer ring or tire, with or without a flange, may then be bent round the felloe, and attached thereto by welding; to do which, it is necessary to apply a curved mould within the felloe, in order to preserve its circular figure whilst under the hammer; and a disc, (see fig. 9,) being put upon the centre, and welded thereto, covers the joints of the spades, and completes the wheel.—[*Inrolled in the Petty Bag Office, February,* 1836.]

To William Vickers, *of Tirshill, in the parish of Sheffield and county of York, merchant, for his invention of a mode of obtaining tractive power from carriage wheels, under certain circumstances.*—[Sealed 6th March, 1839.]

This is a mode of communicating the rotary power of the driving wheels of a locomotive engine to the running wheels, upon which the engine is supported.

Upon the end of the axle of the driving wheels, (that is, the wheels, the axle of which is connected to the motive power of the steam engine,) a pulley is fixed, and a similar pulley is also fixed upon the end of the axle of the running wheels, or those wheels which run loosely and support the engine. An endless band is passed over the pullies, and of

consequence, the rotary power of the driving wheels is communicated to the running wheels, which is thereby intended to assist the tractive power.—[*Inrolled in the Inrolment Office, September*, 1839.

To MOSES POOLE, *of the Bill Office, Lincoln's-inn, in the county of Middlesex, gentleman, for improvements in constructing and applying boxes to wheels,—being a communication from a foreigner, residing abroad.*—[Sealed 28th February, 1839.]

THE patentee states, that considerable inconvenience and instability has been experienced from the ordinary mode of fastening into the wooden naves of wheels the iron boxes in which the axles run. That the longitudinal ribs usually formed on the outsides of the boxes, when inserted in its wooden naves and wedged up, soon become loose, to the great detriment of the proper action of the wheel. It is therefore proposed, as the subject of this patent, that the external surface of the iron box of a wheel, shall be made with a helical thread or screw, winding several times round its periphery, in order that the box may be screwed tightly into the wooden nave, instead of fastening it in by ribs and wedges, as heretofore.

The screw may be formed on the outside of the iron box, by casting it in a threaded mould, or it may have a screw cut upon its outside in a lathe, or by other suitable and convenient means. The patentee does not confine himself to any particular sort of screw, but claims fixing the iron boxes of wheels in wooden naves by screwing them into the wood.—[*Inrolled in the Inrolment Office, August* 1839.]

To John George Shuttleworth, *of the Mount, near Sheffield, in the county of York, soap boiler, for his invention of a new mode of obtaining a rotary motion from the rectilinear motion of the piston rod of a steam or other the like engine.*—[Sealed 18th July, 1839.]

The patentee states, that his invention consists in applying two rows of cogs and guide or steadying pins to an extension or elongation of that part of the piston rod of a steam or other such engine, which when the piston is drawn down, (if the cylinder be placed vertically,) is above the top of the cylinder; and causing these two rows of cogs to act alternately upon segments of cogged wheels, or a segment of a cogged wheel, as the case may be, in such manner as to cause a continuous rotation of the axes or axis of the segments or segment aforesaid, which axes or axis may thereby be used as driving shafts or a driving shaft for machinery, without the intervention of any crank shaft.

In Plate II., fig. 1, represents a front elevation of one application of my said invention. The piston, to be considered as having just completed the up stroke, is shewn as commencing the descent of the down stroke. *a*, represents the cylinder of a steam engine; *b*, the piston rod, working as usual through a stuffing box in the top of the cylinder. The part of the piston rod *c*, which is furnished with cogs, never goes through the stuffing box; but, in all positions of the piston, is above it; *d*, is a channel or groove in the piston rod, working over a dove-tailed feather on the cross bar *e*, to steady it; *f*, *g*, are two segments of cogged wheels, on the shafts of which, are fixed the toothed gear wheels *h*, and *i*, taking into the carrier or communication toothed wheel *k*.

When the piston rod rises, it is represented as carrying with it the segment *f*, and when it descends, it carries with it the segment *g*; and as whichever segment is acted upon by the piston rod causes, by means of the communication wheel *k*, and the two gear wheels *h*, and *i*, the opposite segment to be brought round, a continuous rotary motion in one direction is given to each of the axes or shafts of the segments and toothed wheels.

In order more effectually to secure the release of one segment, and the biting or taking in at the same instant of the other, there is a contrivance *l*, (see fig. 3,) on the centre or communication wheel *k*. This contrivance consists of a raised groove or tappet *m*, fixed on the face of the wheel *k*, which takes a boss or steadying pin, projecting from the piston rod at *n*, alternately with one projecting from the rod at *p*, and thus, secures the ascent of the rod, sufficiently high in one case, to fully release the segment *f*, and catch the segment *g*; and the descent of the rod, sufficiently low in the other case, to secure the full release of the segment *g*, and perfect catch of the segment *f*.

A fly wheel may be placed on either of the three axes aforesaid, which will also add its influence to effect this object, and steady the motion of the engine.

Fig. 2, is a front elevation, shewing the piston rod at half stroke. Fig. 4, represents another application of my said invention, where only one segment is used,—the aforesaid elongation of the piston rod branching into two parts *q*, *r*; and similar letters of reference being used to denote similar parts in all the figures, no further description will be required of this figure.

Now, whereas, I claim as my invention the application of cogged, gear, and steadying pins, such as shewn in the apparatus hereinbefore described, directly to the piston

rod of a steam or other the like engine, for the purpose of obtaining a rotary motion for the driving shaft from the rectilinear motion of the said piston rod, and without the intervention of a cranked shaft.—[*Inrolled in the Inrolment Office, January,* 1840.]

Specification drawn by Mr. Rotch.

To THOMAS MAC GAURAN, *of Golden-terrace, Pentonville, gentleman, for improvements in the manufacture of paper, from a material not hitherto so employed.*—[Sealed 26th August, 1839.]

THESE improvements purport to be the making of paper from a material not heretofore used for that purpose, which material is the fibrous stalks of the hop plant or hop bine.

The mode of preparing these fibrous materials for the use of paper makers, is thus described:—After picking the hops, the bine or stalk of the plant is bruised by being passed between rollers. It is then cut up into lengths of about one or two inches, and afterwards macerated in clear river or rain water for twenty-four hours, and is then reduced to a pulpy state, and in that state, bleached in a solution of chlorine. The chlorine being then removed by washing, the pulp is in a fit condition to be employed either by itself or in combination with linen rags or other materials, commonly used for making paper.

The patentee distinctly states, that he does not claim any thing new in the process of preparing the material, but only claims the bine of the hop plant as a fibrous material never before used for making paper. In this, however, he his mistaken, for the hop plant, and almost

every other kind of fibrous vegetable materials, have been used for making paper many years ago, but without the anticipated advantages.—[*Inrolled in the Inrolment Office, February,* 1840.]

To MOSES POOLE, *of Lincoln's-inn, gentleman, for improvements in apparatus or machinery for obtaining rotary motion,—being a communication from a foreigner, residing abroad.*—[Sealed 8th November, 1838.]

THE object of this invention is to supersede the use of the crank in all kinds of machinery, in which it is necessary to convert a reciprocating rectilineous movement into a continuous rotary motion.

The scheme may be applied in various situations and ways, but the patentee has thought it sufficient to shew the manner of adapting it to a steam engine.

Upon the end of the piston rod, or upon a frame moved in parallel directions by the piston, a pin or stud is fixed, which works in a curved or zig-zag groove, formed round the periphery of a cylinder, fixed on the main axle, which is to be made to revolve. This stud, as it advances or recedes, presses against the sides of the oblique groove, and by such lateral pressure, causes the cylinder, and consequently the main shaft on which it is fixed, to acquire rotary motion.

Plate II., fig. 10, is a horizontal representation of part of a locomotive engine. *a, a,* are two working cylinders, fixed permanently upon the carriage, which is not shewn; *b, b,* are the piston rods passing through both ends of the cylinders, and attached at their extremities to a sliding parallel frame *c, c, c, c.*

At the ends of a central shaft *d, d*, are fixed the running wheels *e, e*, of a locomotive carriage; the connection of the axle to, and construction of the carriage, it is unnecessary to exhibit. Upon this central shaft are fixed two cylindrical blocks *f, f*, each block having a curved or zig-zag groove cut round its periphery. From the under part of the frame *c, c*, studs project, which take into the curved or zig-zag grooves in the blocks; consequently, as the frame *c, c*, is made to slide to and fro, from side to side, by the reciprocating action of the pistons in the working cylinders *a, a*, the studs in the frame pressing against the oblique sides of the curved or zig-zag grooves in the blocks *f, f*, force the central shaft round, and cause the running wheels to revolve and pass over the road.

Levers *g, g*, mounted upon the frame *c, c*, afford the means of drawing the studs out of the grooves of the blocks, and thereby of separating the connection of the driving power of the engine from the wheels of the carriage.

A modification of the plan is proposed, in which curved or zig-zag grooves are placed in the insides of two independent cylinders, and the piston rods passing through the axes of these cylinders, carry projecting studs, which act in these grooves, and cause the cylinders to rotate; but no method is shewn by which such revolving cylinders are to communicate their rotary motion to other machinery.

This mode of converting a reciprocating action into a rotary power, is said to be applicable in a great variety of ways, besides that of its adaptation to the steam engine; it must, however, be obvious, that this scheme is neither new, as a mechanical agent, nor so simple and efficacious as the crank which it is intended to supersede.—[*Inrolled in the Inrolment Office, May*, 1839.]

To Antonio Movillon, *of Dorset-place, Dorset-square, gentleman, for improvements in machinery for propelling ships, boats, and other vessels on water, designed to supersede the use of paddle wheels.*—[Sealed 23rd April, 1839.]

These improvements in machinery for propelling ships, boats, and other vessels on water, designed to supersede the use of paddle wheels, consist in a novel construction of machinery for working a system of expanding paddles, which paddles are intended to act in the manner of the foot of a duck, or other aquatic bird, when moving in the water.

The paddles, and the machinery for working them, are to be applied at the stern part of the ship, or at its sides, and may be put in motion by steam or any other suitable driving power, for the purpose of propelling the vessel, and may be constructed of any required dimensions,—one principal object being the adaptation of this construction of propelling machinery to ships of war, or other vessels of the larger class, instead of employing paddle wheels, which are inconvenient, and occasion a considerable loss of power.

The accompanying drawings, (see Plate III.,) represent merely the expanding paddles, and the mechanism by which they are to be worked, for in that mechanism alone, consists the improvement which constitutes the subject of this invention.

Figs. 1, and 2, represent, in elevation and in different positions, the machinery, detached from a vessel, by which the paddles are expanded and contracted, driving their passage through the water; fig. 3, is a plan or horizontal view of the frame, carrying the crank shaft with the rods

attached thereto, by which the improved machinery is worked; and fig. 4, is a front view of the paddle on the duck's foot principle, expanded ready for giving the propelling stroke; the similar letters of reference pointing out the same parts of the machinery in all the figures.

a, a, is the crank shaft; *b, b,* the cranks to which the rods or bars *e, e,* are attached, for working the expanding paddles; *c,* is another crank on the shaft *a,* (see fig. 3,) to which a rod *d,* is connected, leading from the steam-engine or other first mover, and by which rod *d,* the crank shaft is made to revolve; *f,* and *h,* are the legs or long levers to which the duck's foot paddle is attached at the bottom; *i, i,* are the two flaps or board plates, constituting the paddle;—they are hung upon a joint pin *k,* at the lower end of the leg *f*; two rods or levers *l, l,* attached by a joint pin *m,* to the lower end of the other leg *h,* are connected by joints to the backs of the plates *i, i,* and consequently by the opening or closing of the legs *f,* and *h,* the broad surface of the paddle is made to collapse, so as to pass edgewise through the water, with the least possible obstruction, or to open out and present its expanded surface to the water in the act of propelling.

The rod or bar *e,* is a lever, working on a fulcrum pin or stud *n,* set in the leg *f,* as shewn at figs. 1, and 2, the end of the longer arm of the lever *e,* working on the crank *b.* The shorter arm of the lever *e,* marked *e*,* has a segment plate *g, g,* firmly affixed to it by rivets, which segment plate has a curved opening or slot formed in it, and a pin or stud *p,* fixed in the other leg *h,* works in the curved opening of the segment plate. By means of these connecting parts, the action of the lever *e,* driven by the crank *b,* causes the legs *f,* and *h,* to vibrate, and to work the paddles in the manner following:—

In the positions of all the levers and the crank, as

represented in fig. 1, the plates *i*, *i*, of the duck's foot paddle will be expanded as shewn, and which are then in the position for performing the propelling stroke through the water. The rotary progress of the crank *b*, in the direction indicated by the arrow, to the situation shewn by dots at b^2, will cause the legs *f*, *h*, to carry the paddle in its expanded form through the water, to the situation represented by dots at *i*, i^2. The further rotary progress of the crank to b^3, will carry the paddles to the position, shewn at *i*, i^3, which is nearly the end of the propelling stroke.

The rotary progress of the crank to the position b^4, represented in fig 2, will place the lever *e*, and the legs as at f^4, and h^4, where it will be perceived that the duck's foot paddle is collapsing, and about to return through the water, the plates *i*, i^4, being now in such positions, as only to present their edges to the water. When the crank arrives in its rotary course at the lowest point b^5, the levers and the propelling plates will assume the positions, shewn by dots at f^5, h^5, and *i*, i^5, and the further progress of the crank to b^6, will put all the parts, as represented by dots at f^6, h^6, and *i*, i^6. On the advance of the crank to b^7, the propeller will begin again to expand, as at *i*, i^7, having passed through the back stroke from *i*, i^4, to *i*, i^7, edgewise; and on the crank arriving at the point of its rotation *b*, as in fig. 1, it will have expanded wide open, and be ready to perform the propelling stroke through the water, as above described.

It will be perceived that the expanding and collapsing of the plates *i*, *i*, of the paddles, as the legs *f*, *h*, perform their oscillating movements, will be effected by the different positions assumed by the levers *l*, *l*, which are determined by the opening and closing of the legs, *f*, *h*; and that this will be governed by the movements of the

segment plate *g*, turning upon the studs *n*, set in the leg *f*, the groove of which segment plate acts upon the pin or stud *p*, fixed in the leg *h*. I do not, however, intend to confine myself to the use of the grooved segment plate *g*, as the same effect may be obtained from the adaptation of compound levers, one mode of doing which, is shewn at figs. 5, and 6.

In this instance, in place of the grooved segment plate, I bend down the shorter arm of the lever *e*, as at *e**, and connect its end to another lever or link *j*, attached by a joint to the end of *e**, and also connected in a similar manner to the stud or pin *p*, fixed in the leg *h*. By the rotary movement of the crank *b*, the lever *e*, will give the oscillating motion to the legs *f*, *h*, as above described, and which by the action of the levers *e*, and *j*, will cause the legs to open and close as they vibrate, and thereby to expand and collapse the paddle in the same way as in the former construction of apparatus, the various positions of which, are shewn in the two last-mentioned figures, by dotted lines.

I do not intend to limit myself to any particular number of paddles, to be connected in my improved manner, to one crank shaft, as it must be obvious, that one, two, or more paddles may be worked by the same crank shaft, if desired and found convenient; and their situation, either at the stern or sides of the vessel, must depend upon circumstances of eligibility.

In the horizontal view of the apparatus shewn at fig. 3, it will be perceived that I have mounted the crank shaft upon a curved frame or bearing *r*, *r*. This mode of mounting it may be found desirable when the propelling apparatus is adapted to the stern of a vessel, as by means of a segment rack *s*, and pinion *t*, the bearing frame, with the whole of the propelling apparatus, may be turned at

such an angle as to enable the vessel to counteract the effects of strong currents and leaways.

Having thus fully set out my improvements in machinery for propelling vessels, it will be unnecessary to recapitulate its features of novelty, as that must be fully understood by the description above written.—[*Inrolled in the Rolls Chapel Office, October,* 1839.]

Specification drawn by Messrs. Newton and Berry.

To LAWRENCE HEYWORTH, *of Yewtree, near Liverpool, in the county of Lancaster, merchant, for his invention of a new method of applying steam power directly to the periphery of the movement wheel, for the purposes of locomotion, both on land and water; and for propelling machinery.*—[Sealed 30th August, 1838.]

THIS invention is a peculiar construction of rotary steam engine. The revolving drum or wheel is formed with a pentagonal periphery, having circular flanges on its ends, and is partly embraced by a broad segmental cover, which fits closely and steam-tight upon the periphery of the flanges, thereby forming a close segmental chamber for the steam to act in between each angle.

A sliding steam stop, which the patentee denominates an *epiglottis,* passes down perpendicularly through the segmental cover, and comes in contact with the periphery of the pentagonal drum.—Steam is then thrown into the segmental chamber, and there exerting its force between the angular surface of the pentagonal drum, the segment cover, and the sliding steam stop, causes the drum or wheel to be impelled round,—the axle of which is to communicate its rotary power for propelling vessels, or driving any kind of machinery.

It is obvious that as the lower edge of the steam stop is not acting against a uniform circular surface, but against the pentagonal surface of the drum, the stop or *epiglottis* must rise and fall, in order to keep its contact with the pentagonal periphery. This the patentee purposes to effect by throwing a pressure of steam on the top of the sliding steam stop, which shall always force it downward, and keep it continually acting against the pentagonal surface.

Plate II. fig. 11, represents the machine partly in section; *a*, is the axle or shaft of the wheel or drum; *b, b, b, b, b*, are the pentagonal surfaces which form its periphery; *c, c, c, c, c*, is the circular flange of one end of the drum; and *d, d, d*, is the broad segmental cover which embraces a portion of the periphery of the drum, the cover being confined in its situation by suitable braces, connected to the frame or standard of the machine.

On the top of the segmental cover, a steam-tight chamber or box *e, e*, is affixed, and from that chamber the sliding steam stop *f*, is introduced through an opening in the cover, and being pressed downward, its lower end is brought in contact with the periphery of the drum or wheel.—The sides of the sliding steam stop are tightly packed, so that no steam may pass from the box *e*, to the periphery of the drum.

A tube *g*, conducts steam from a boiler, whence it passes through the pipe *h*, into the upper segmental chamber of the drum; and through another pipe *i*, into the box *e*. The pressure of the steam in the box *e*, acting upon the upper part of the steam stop *f*, forces it down at all times into close contact with the periphery of the drum *a*; and the force of the steam passed through the pipe *h*, acting in the segmental chamber, between the wheel and its cover *d*, being unable to raise the cover or displace the stop *f*,—causes the angular surface of the drum to recede, and con-

sequently the wheel to revolve in the direction of the arrow, until the approaching angle of the drum has passed the steam pipe *h*, when the steam which occupied the chamber escapes below, and a fresh volume of steam enters the next segmental chamber, and acting in the same way, keeps the wheel or drum in a continued rotary motion.

The patentee considers that some of the parts of this machine are not new,—he therefore does not claim them separately, but he claims them collectively, and does not confine himself to a pentagonal drum, as some other poligonal figure might answer the purpose; but he claims, particularly, pressing down the steam top to its bearing on the periphery of the drum, by the force of steam in the chamber above; and under some circumstances he assists that effect by the aid of magnetic attraction, making the periphery of the drum of steel, and magnetizing the steam top.—[*Inrolled in the Inrolment Office, October*, 1838.]

To George England, *of Gloucester-terrace, Vauxhall Bridge road, in the county of Middlesex, engineer, for an improved screw jack, for raising or moving heavy bodies, both vertically and laterally.*—[Sealed 7th May, 1839.]

This improved screw-jack, for raising or moving heavy bodies, both vertically and laterally, is designed, principally, for convenient adaptation to railways, in order that the screw-jack may be readily applied to replace engines or carriages upon the lines of rails, in the event of their getting off the lines by accident.

The accompanying drawing (see Plate III.) represents the improved screw-jack in several positions. Fig. 7, is a

side elevation of the screw-jack; fig. 8, is an end elevation of the same; and fig. 9, is a horizontal view, taken from above.

A substantial rectangular frame *a, a,* of cast iron, or other suitable material, forms the stationary base of the screw-jack, upon the top edges of which base, a carriage or moveable frame *b, b,* is mounted, and intended to slide. To the upper side of this carriage or sliding frame, four pillars *c, c, c, c,* are affixed, for the purpose of supporting the socket or screw-box *d,* above, through which the perpendicular screw-shaft *e,* works. The upper part of this screw-shaft is formed into a boss *f,* having apertures through it for the reception of the end of a hand-spike, bar, or lever, by which the screw is turned in its socket for the purpose of raising or lowering it. At the top of the vertical screw-shaft, a block *g,* is attached, which is enabled to turn round loosely thereon. When the screw-jack is brought into such a situation as to enable the block *g,* to bear perpendicularly against the under part of the body to be raised, the perpendicular shaft must be turned round, and the operation of lifting the weight will be effected exactly as by the working of an ordinary screw-jack.

The carriage, or other weighty body, having been thus raised from its position on the lines of railway, or other situation, may now, by my improved apparatus, be immediately moved laterally by the following means:—A horizontal screw-shaft *h, h,* mounted in suitable bearings in the ends of the base frame *a, a,* in which it is enabled to be turned freely by means of a winch or lever.—This screw shaft *h,* passes through two screw-boxes *i, i,* formed in, or affixed to the sliding frame *b, b,* and, consequently, as the screw-shaft *h,* is made to revolve, the frame, with the screw-jack, will be slidden laterally upon the base frame, and the railway carriage, or other body, which it is

supporting, will be moved off the rails or situation with great facility.

As it may be inconvenient to turn the horizontal shaft *h*, by means of an ordinary winch, I have adopted a lever and driving click or pawle to be applied to a ratchet wheel, fixed on the end of the horizontal shaft, by means of which a very considerable manual power may be applied to actuate the shaft when heavy bodies are required to be moved laterally. Fig. 10, represents the lever *k*, with its driving click or pawle *l*, taking into a ratchet wheel *m*, which is shewn in operation in fig. 7. The ratchet wheel *m*, is mounted in the forked end of the lever *k*, turning upon a hollow axle, which hollow axle has a square aperture through it, fitted to the square end of the shaft *h*. The click or pawle *l*, being pressed by a spring, takes into the teeth of the ratchet wheel *m*. The lever and ratchet wheel being placed upon the square end of the shaft *h*, as shewn in fig. 7, by working the lever to and fro, the ratchet wheel will be driven round, and with it the shaft *h*, and the screw-jack, with its frame, made to slide along upon the surface of the base frame, as before described.

The patentee says, lastly,—I desire it to be understood, that I do not claim, as new, the construction of the screw-jack, but I do claim the improvement which I have introduced and appended to a screw-jack; that is, adapting the screw-jack to be moved laterally, by the apparatus shewn in the drawing, or by any other mechanism suited to effect the same object, for the purpose of enabling me, after raising a railway carriage or other heavy body, by means of the screw-jack, to shift the position of the said carriage or other heavy body, with facility, in a lateral direction or sideways.—[*Inrolled in the Rolls Chapel Office, November*, 1839.]

Specification drawn by Messrs. Newton and Berry.

To Henry Griffiths, *of Acton-place, Camden-town, in the county of Middlesex, artist, for improvements in the process of producing prints or impressions from steel, copper, or other plates.*—[Sealed 25th May, 1839.]

These improvements in the process of producing prints or impressions from steel, copper, and other plates, have for their object the production of imitations of drawings, by several successive operations of printing different colours or tints upon paper or other suitable material, each successive impression being so carefully placed as to register with perfect accuracy and fit the previous impression, in order that, when the several successive impressions have been so taken upon one sheet, tablet, or surface of paper, or other material, the whole shall produce the effect of a drawing or picture delineated in its various tints or colours with a camel's hair or other pencil.

In performing this process, it is necessary first to provide a series of three, four, or more plates of copper or steel, as many in number as may be required to produce the different gradations of tints or of colours in the drawing to be imitated upon; these plates must be produced severally by the ordinary process of etching, stippling, aqua-tinting, or mezzotinto, or other suitable modes of engraving the selected parts or portions of the drawing which are to be represented by the particular tint or colour printed from each individual plate.

When the several plates have been thus engraven, there must be lines or registering points marked upon all the plates accurately corresponding, in order that the first impression upon the paper may exactly register with the parts of the subject upon the successive plates.

The patentee has accompanied his specification with a series of prints, taken in the several stages of the operation, which it must be obvious we are unable to give examples of; and proceeds to state, in reference to the production of such subjects, the manner of proceeding.—

Supposing, he says, that I am about to print a flower in colours in imitation of a drawing,—I produce upon a plate, by some of the modes of engraving above alluded to, the form of the pale yellow part of the flower, which I then print upon the paper; I next produce a plate, having only that part of the flower engraven on it which is to represent the central bright tint and the green stalk which I print upon the former impression. A third plate is then provided, having the forms of the shadows only; this is to be printed upon the two former. And, lastly, I produce a plate on which is engraven the deep purple tint of the flower, and having printed the last upon the three preceding impressions, I hereby complete the picture of the flower.

Again, supposing that the subject of the drawing to be imitated is a landscape,—I engrave a plate with the forms only of the grey tints, representing hills and sky, and parts of the foreground, and having printed this, produce the imperfect or first stage of the picture; a second plate is then provided, having only the forms of the yellow tints of the drawing, which is to be printed on the previous impression, and which will thus give to the picture the second stage of advancement; a third plate is then to be employed, having only the shades of the brown colour and broad shadows of the picture, which being printed upon the two preceding impressions, gives a resemblance of the landscape drawing in a further advanced stage. Lastly, I provide a plate, having the stronger or more powerful parts of the picture engraven on it, and having printed this upon

the three previous impressions, produce a finished copy of the drawing, which I desired to imitate.

The patentee further remarks, that he does not always print with oil colours, as some of the tints, designed to imitate water colours, would lose much of their brilliancy and delicacy if mixed with oil; he therefore sometimes employs moist water colours for printing; but, wherever brilliancy and purity are essential, he prefers to use the colour in a dry powdered state.

The process of printing with oil colour is so well known as to render any description of it unnecessary. That of printing from moist water colours has also been of late in use; but, if not generally known, it is merely necessary to observe, that the parts of the plate to be printed by moist water colours, are covered by a small dabber, and the smooth surface of the plate wiped clean by a damp rag.

In printing with dry colours, I first grind the colour with pure water or spirits of wine, and, when dry, reduce it to a very finely powdered state; I then apply the powdered or dry colour to the parts of the plate required by means of a camel's-hair pencil, and carefully wipe off all the superfluous colour by the hand, or by a soft leather. The plate is then put into the press, and the damped paper laid upon it, and after the dry colour impression has been given to the paper, by passing the plate under the rollers, the successive impressions should be taken whilst the paper remains damp, excepting in cases where great force of colour is required, which may be promoted by drying the paper between each stage.—[*Inrolled in the Rolls Chapel Office, November,* 1839.]

Specification drawn by Messrs. Newton and Berry.

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Annual Report.)

Session 1840.

The Council of the Institution of Civil Engineers, on resigning the trust confided to them by the last Annual General Meeting, solicit the attention of this Meeting, and of all those who are interested in the welfare of the Institution, to the following Report on the Proceedings and on the state and prospects of the Institution at the close of this the twenty-first year of its existence. At the last Annual General Meeting, the Council of the preceding year had the gratification of congratulating the Institution on its then assembling in its new premises, under circumstances which furnished so advantageous a contrast with the condition of earlier years, and such convincing evidence of the steady progress and success which had attended the labours of the Council and the co-operation of the general body. And though the year which is now closed upon you may not have been marked by events of so striking a character as the preceding one, the Council nevertheless experienced the highest degree of satisfaction in reviewing the proceedings of the Session of the year so auspiciously commenced. Aware of the more extensive duties and increased responsibility entailed upon them, the Council have endeavoured so to direct the affairs of the Institution as to keep pace with its growing importance; and they can with confidence assert, that the proceedings of the last Session have not been inferior in interest or importance to those of any preceding Session; whilst the attendance at the meetings, and the anxiety which is evinced by strangers to become

acquainted with the proceedings and objects of the Institution, shew the estimation in which it is held both at home and abroad, and fully warrant the most sanguine anticipations of its future and continually increasing success.

The attention of the last Annual Meeting was directed to the expediency of some alteration in the existing laws, particularly with reference to the election of Officers and the number of the Council. It was suggested that the annual election of the Council should be conducted in a somewhat different manner from that hitherto pursued; that a greater number than that constituting the Council should be nominated, and that, consequently, each person at the Annual General Meeting, instead of, according to the then existing practice, erasing one name and substituting another, should erase as many names as the number on the Balloting List exceeded the constituted number of the Council. It was also suggested, that it would be for the advantage of the Institution that the Council should be increased by the addition of two Members: That as some Members of the Council are frequently prevented by professional engagements from regular attendance, the Council should be enlarged to as great an extent as might be consistent with the true interests of the Institution. These and some other suggestions for the better regulation and stability of the Institution were subsequently submitted to a General Meeting of Members, and now constitute part of the Bye-Laws of the Institution.

The practice of other societies in publishing their Transactions in parts, containing such communications as were ready at frequent and short intervals, was briefly touched upon in the last Report, and was discussed in considerable detail at the last Annual Meeting. Such is the nature of some communications, that delay in the publication may be considered not only as a positive injustice to the author, but as detrimental to the cause of practical science and the best interests of the Institution; and if the publication of such papers be delayed until a whole volume is ready, authors will inevitably avail themselves of

other channels for bringing their labours before the world. Add to which, when a whole volume, containing many valuable plates, is to be published, the sources of delay are numerous, and such as cannot be avoided. The Council conceive that the experience of the past year has fully borne out the preceding views, and shewn the great importance and value of prompt publication. Early in the Session the Institution received a most valuable communication from your member, Mr. Parkes. It was considered desirable that the publication of this communication, forming as it did a continuation of his researches already published in the second volume of the Transactions, should not be delayed. No other communications being then ready for publication, the Council resolved to publish it at once as the first part of the third volume. This has now been for some time in the hands of the public, and the number of copies which have been disposed of shews the great desire evinced to obtain these papers so soon as published. The Council have also had still further proof of the importance of this plan. The Institution received during the last Session several communications well suited for publication in the Transactions, and among them the continuation and conclusion of that already mentioned by Mr. Parkes. Preparations were made for the immediate publication of these papers in a second part; difficulties and delays, which could not have been foreseen or prevented, occurred in the publication of some of them, and thus the second part contained but two instead of nine communications originally destined for it. The greater portion of the remaining seven papers are already printed and the plates engraved, so that the third part will be in the hands of the Institution in a very short time. There are several other valuable communications in the possession of the Institution now in the course of preparation for publication, and which will appear so soon as circumstances will permit.

The Minutes of Proceedings have been printed at such short intervals, during the Session, as the abstracts of Papers and Minutes of Conversation would furnish sufficient materials.

The Council conceive that great advantages may, and indeed have resulted from a publication of this nature. An authentic account of the communications is thus immediately furnished, attention is continually kept alive to the subjects which are brought before the Institution, and the statements there recorded have elicited very valuable communications, which otherwise would probably never have been called forth. No one can turn over the Minutes of the last Session without remarking the number and the diversity of the facts and opinions there recorded, very many of which were elicited by the statements contained in some written communication, or casually advanced in the course of discussion.

The Council cannot omit this opportunity of insisting on the importance of these discussions in promoting the objects which the Institution has in view. The recording and subsequent publication of these discussions are features peculiar to this Institution, and from which the greatest benefits have resulted and may be expected, so long as the communication of knowledge is solely and steadily kept in view. It would be easy to select many instances, during the last and preceding Sessions, of some of the most valuable communications to the Institution owing their origin entirely to this source. The first communication from Mr. Parkes arose entirely out of the conversations which took place on the superior evaporation of the Cornish Boilers being referred to as one cause of the great amount of the duty done by the Cornish Engines. The communication by Mr. Williams on Peat and Resin Fuel owes its origin to his being accidently present at the discussion on the uses of turf in the manufacture of iron: whilst that by Mr. Apsley Pellatt, on the relative heating powers of Coke and Coal in melting glass, arose entirely from the discussion of the facts stated by Mr. Parkes respecting the superior evaporation produced by the coke from a given quantity of coals, than by the coal itself. And lastly, the extremely interesting and highly valuable discussion at the commencement of last Session, on the uses and applications of turf; and on the extraordinary coincidence between the results

obtained by Mr. Lowe, Mr. Parkes, Mr. Apsley Pellatt, and Marcus Bull, of Philadelphia, experimenting as they did with totally different views, and under totally different circumstances, must be fresh in the recollection of all present.

But, besides the positive advantages which have thus resulted, and may be expected, from a steady adherence to these practices so peculiar to this Institution, there are others of the greatest value to those engaged in practical science. By this freedom of discussion, statements and opinions are canvassed, and corrected or confirmed, as soon as promulgated—the labours of authors and claims of individuals are made known and secured as matter of history—and attention is continually kept alive to the state and progress of knowledge in those departments of science which it is the especial object of this Institution to promote. The Council trust, therefore, that those individuals who have stored up knowledge and facts for many years past, and devoted themselves to some particular branch of science, will consider how much they have in their power to contribute, and how great is the assistance which they can render to the labourers in other branches, and, above all, to those who are ambitious of following in their steps, by freely communicating, either orally or in writing, the knowledge which they have collected; so that the records of the Institution may be unparalleled for the extent and correctness of the information which they contain.

List of Patents

Granted by the French Government from the 1*st January to the* 31*st March,* 1839.

PATENTS FOR FIFTEEN YEARS.

To John Davies, of Manchester, represented in Paris by M. Perpigna, advocate, of the French and Foreign Office for Patents, Rue de Choiseuil, No. 2 ter: for improvements in the means employed to burn the smoke in furnaces of steam boilers, which improvements prevent explosions.

Edward Brown, of Oldham, county of Lancaster, represented by M. Perpigna, advocate, for improvements in spinning machines.

Alexandre Cousin, represented in Paris by M. Perpigna, advocate, for a machine for making bricks.

V. Petit and Sons, of Calais, represented in Paris by M. Perpigna, advocate, for improvements in knitting frames.

Elijah Paine, of New York, represented by M. Perpigna, advocate, for a new motive power, founded upon galvanism.

Madame Egérie Anne Casauban and John Pierre Hyacinthe Granal, of Paris, for a process for manufacturing tobacco.

Alexandre Edme Beaulard, of Paris, for an extraction of four different products from soapy waters

Jean Légé and Edme Noël David Praux, of Bordeaux, for an improved method of transferring lithographic impressions upon all kinds of pottery.

Pierre Jean François Henri Durant Morinbar, of Paris, for a process for enamelling iron, cast iron, and copper.

Stanislas Irroy, of St. Mandé, near Paris, for a new calefyer.

Adam Luszczewski, of Paris, for a new system of paving and flagging.

Felix André Barrand, of Antony, (Seine,) for clarification, on a large scale, of muddy water.

Théophile Jules Pelouze, of Paris, for a new method of manufacturing sulphuric acid.

Louis Melchior Balthazard Locatelli, of Paris, for a new file.

François Antoine Nicolet, of Paris, for an improved cutting machine.

François Ange Eugêne Trotin, jun., for a rolling apparatus for working iron.

James Milne, of Edinburg, for a new gas regulator.

Cyx Pierre Gerle, of Paris, for an impermeable and transparent paper.

François Antoine Jecker, of Paris, for an improved power engine, worked by gas.

Georges Siccardo, of Marseilles, for a rotatory engine, to be worked by steam.

Tatet and Hamelin, of Paris, for an apparatus for melting tallow by steam.

Jeam Marie Louchon, of Paris, for a new filtering apparatus.

Muel-Doublat, of Paris, for manufacturing of horse-shoes by machinery.

Marquis of Jouffroy, of Paris, for a propelling apparatus, to be worked by steam, and applicable to boats, ships, or other vessels.

Pierre Bergeron, of Bordeaux, for an improved axletree.

Etienne Ajasson, of Paris, for an application of hard substance to the making of bearings or plummer boxes for all kinds of shafts.

Jean Baptiste Dunond, of Lyons, for improvements in the spinning of silk.

PATENTS FOR TEN YEARS.

To Jean Baptiste Michel Rene Loysel, represented in Paris by M. Perpigna, advocate of the French and Foreign Office for Patents, Rue Choiseuil, No. 2, ter: for a new kind of play, called *Jeux Loysel.*

Pierre Etienne Gandon Aubry, and Auguste Joseph Robert, of Reims, (Marne,) represented by M. Perpigna, advocate, for guns, calculated to fire several shots without recharging.

Henri Hind Edwards, represented by M. Perpigna, advocate, for improvements in locomotive engines.

John Coope Haddan and John Johnston, of London, represented by M. Perpigna, advocate, for an apparatus for warming and ventilating apartments.

Christophe Vaux, of Woodford Bridges, county of Essex, represented by M. Perpigna, advocate, for a method of restraining and diminishing the damage resulting from the shock given by the waves of the ocean.

François L'homme, of Paris, represented by M. Perpigna, advocate, for a new kind of iron stair-case.

Jérémie Whitaker, of Vidion, near (Mezière Ardennes,) represented in Paris by M. Perpigna, advocate, for artificial leather for the setting of wire cards.

Jean Baptiste Andue, of Lyons, represented in Paris by M. Perpigna, advocate, for a machine for making plain and figured tissues.

Dominique Saski, of Chalons sur Saone, represented in Paris by M. Perpigna, advocate, for a new stove.

Louis Charles Simon Burle, of Toulon, represented by M. Perpigna, advocate, for a new system of casing for ships, which keeps them dry whilst under repair.

Michel Doguin, of Lyons, represented by M. Perpigna, advocate, for a machine for making all kinds of laces and bobbin net.

Elie Lacroix, of Morey, (Jura,) represented in Paris by M. Perpigna, advocate, for spiral fluted cylinders for rolling up heavy ropes.

Dominique Vigezzi Riva, and Auguste Doninelli, of Lyons, for a machine for milling silk.

Simon Béchade, of Bordeaux, for a machine for extracting the seeds from grapes.

François Sorlin and Pierre Maire, of Paris, for an application of gilded zinc ornaments, on wood and copper, in clocks, vases, &c.

John Ryland, of London, for a new screw press.

Louis Henri Jules Truffaut, of Paris, for means of grinding and polishing window and crown glass.

Jean Baptiste Raulin, of Paris, for carriage springs acting on compressed air.

Baudelier, of Béfort, for an improved method of bill-sticking.

Michotte and Co., of Paris, for an improved brick-making machine.

Charles Hamond, for a new locomotive engine.

Richard Bellin Cooper, of London, for improved fire arms.

Aignan Placide Brisset, of Paris, for a method of transporting earth.

Antoine Jean Louis Huet, of Paris, for improvements in locomotive engines.

Francis William Gerish, of London, for fastenings for doors, windows, shutters, &c.

Winkel and Volhaber, of Paris, for a new means of opening and shutting Persian blinds.

Jean Henri Morin, of Bordeaux, for a new stove.

Pierre Tharaud, of Limoges, (haute Vienne,) for glazed pottery pipes.

Louis François Vauquelin, of Paris, for improvements in the dressing of tanned leather.

John Seaward, for improvements in steam engines.

Aimé François Alphonse Bousseville, of Paris, for silver alloy, called *Wolfram*.

Emile Martin, of Paris, for economical gas for lighting.

Charles Louis Joseph Carville, of Paris, for a brick-making machine.

George Richard Elkington, for a method of silvering metals and laying coats of zinc on those which admit of it.

Eugêne Alfred Cornu, of Havre, for improvements in steam engines.

James White, of London, for a frame for making silk purses.

Nicholas Simon, of St. Dié, (Vosges,) for portable economical boilers.

Moses Poole, of London, for improvements in spinning frames.

Moses Poole, of London, for an apparatus for filtering all kinds of liquids.

Samuel Mordan, for improvements in steam engines.

PATENTS FOR FIVE YEARS.

To Moinier Legoux, represented in Paris by M. Perpigna, advocate of the French and Foreign Office for Patents, No. 2, ter: Rue Choiseuil, for manufacturing of paper with all kinds of vegetable matter.

Marie-Ange Hussenet, of Paris, represented by M. Perpigna, advocate, for a new pump.

Etienne Lutcaud, of Loches, (Saone and Loire,) represented by M. Perpigna, advocate, for a new press.

Jean Marie Guyot, of Paris, represented by M. Perpigna, advocate, for a small ear-acoustic horn.

Jean Pierre Benoît Dulaurier, of Paris, represented by M. Perpigna, advocate, for improvements in rail-roads.

Jean Dominique Jalasson, represented in Paris by M. Perpigna, for moveable covers for book-binding.

Pierre Paul Detrand, of Laon, (Aisne,) represented in Paris by M. Perpigna, advocate, for a hand-barrow for transporting the sick without touching them.

Philibert Pillard, of Lyons, represented in Paris by M. Perpigna, for impermeable shoes and boots.

Kestener, of Havre, represented in Paris by M. Perpigna, for improvements in buildings.

Etienne Chabert, of Lyons, represented in Paris by M. Perpigna, for new iron combs.

Coutures Brothers, of Bourdeaux, represented in Paris by M. Perpigna, for glass stoppers.

Robertson and Co., of Paris, for improved grease for lubricating machinery.

Felix Moreau, of Paris, for bas-relief and sculpture in imitation marble.

Jean Pierre Carette, of Paris, for moveable decorations for apartments.

Edward Buran, of Paris, for an extraction of sulphur from pyrites and other sulphurets.

Claude Martin Herbinot, of Paris, for a new lock.

Emmanuel Cousin, of Paris, for improvements in waggons for rail-roads.

Augustin Claro, for water odontalgie

Nicolas François Manger, of Paris, for an economical stove.

Adolphe Eugêne Louis Jolly, of Paris, for improvements in pen-holders.

Eugêne Alfred Cornu, of Havre, for a mechanical windlass for raising weights.

Julien Etienne Chavin and Marie Louise Augustine Chavin, to the application of elastic web to the making of boots and gaiters.

Antoine Barral, of Paris, for a slide for umbrellas.

Nicolas Coquet, of Bordeaux, for powder for cleaning hair.

François Marie Kagoneau, of Paris, for an adaptation of the bud of cocoa nut to all the uses of horse-hair.

Jacques Isidore Pasquier, for carriages for the transport of asses, so as to milk at the customer's door.

Jean Céleste Nicole and Louis Leverin Finbert, of Paris, for a smoke consuming apparatus, applicable to lighting.

Joseph Pierre Chantriaux, of Rheims, (Marne,) for a wheel for winding of refuse silk, worsted, or cotton.

Henri Arrault and Louis Jacques Lotteau, of Montmartre, near Paris, for bitumen, called *iron-bitumen.*

Grégoire and Co., of St. Ivroux, (Orne,) for an imitation marble made of glass.

Blimond Roy, of St. Blimond, (Somme,) for a new lock.

Jean Perlet, of Frans, (Var,) for a machine for raising water.

Casimir Alexandre Jules Pierre Eveillard, of Pré St. Gervais, near Paris, for an apparatus for preventing robberies in apartments.

Antoine François Marie Leda, of Paris, for improvements in pumps.

Durand Brothers, of Grasse Drome

André Etienne Chaillot, of Paris, for improvements in making harps.

Auguste Jacquemynes, of Paris, for a steam apparatus for warming apartments.

Edouard Antoine Brisbart, of Montmirail, for trousers straps.

Marie Letestu, of Paris, for an improved pump.

Jean Louis Auguste Buffet, of Paris, for an improved flute.

Jean Baptiste Jallat, of Paris, for a double-action press.

Jean Casauban, of Bayonne, for an improved apparatus for giving light to dark houses.

Pierre Louis Duclos, of Paris, for a new saddle, with metallic holsters.

List of Patents

Granted for Scotland subsequent to 22d February, 1840.

To James Beaumont Neilson, of Glasgow, for certain improved methods of coating iron, under various circumstances, to prevent oxidation or corrosion, and for other purposes.—Sealed 25th February.

William Pontifex, of Shoe-lane, London, for an improvement in treating fluids containing colouring matter, to obtain the colouring matter therefrom.—Sealed 3rd March.

Thomas Oram, of 27, East street, Red Lion square, London, for improvements in the manufacture of fuel.—Sealed 3rd March.

William Forrester, of Barrhead, Renfrewshire, for certain improvements in sizing, starching, dressing, and otherwise preparing warps for weaving fabrics, and in the machinery and apparatus therewith connected.—Sealed 6th March.

John Burn Smith, of Salford, for certain improvements in machinery for preparing, roving, spinning, and twisting cotton, and other fibrous substances.—Sealed 6th March.

Laurence Wood Fletcher, of Chorlton-upon-Medlock, Manchester, for an improvement or improvements in the manufacture of woollen and other cloths or fabrics, and in the application of such cloths or fabrics to various useful purposes.—Sealed 14th March.

Joseph Scholefield, of Littleborough, in the county of Lancaster, cotton spinner, and Edward Leach, of the same place, cotton spinner, for certain improvements in looms for weaving various kinds of cloth.—Sealed 18th March.

William Maltby, Junior, of Mile-end, chemist, and Richard Cuerton, of Percy-street, London, brass-founder, for improvements in extracting and concentrating the colour, tanning, and other matters contained in vegetable and animal substances.—Sealed 18th March.

THE

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JOURNAL AND REPERTORY

OF

Arts, Sciences, and Manufactures.

CONJOINED SERIES.

No. XCIX.

Recent Patents.

To William Newton, *of the Office for Patents, Chancery-lane, in the county of Middlesex, civil engineer, for an invention of certain improved machinery, for cutting and removing earth; which machinery is applicable to the digging of canals and the levelling of ground for railroads, or ordinary roads, and similar earth works,—being a communication from a foreigner, residing abroad.*—[Sealed 27th March, 1839.]

This improved machinery for cutting and removing earth, consists in a peculiar arrangement and construction of apparatus, mounted in a carriage, in which a series of rotary cutters or peckers are made to break the ground as the carriage advances; and also to conduct or throw the earth thus loosened into a series of travelling buckets or shelves, which carry it up out of the excavation and deliver it into

a series of troughs, moving in a transverse direction, for the purpose of carrying off and discharging the loose earth so raised, into carts, or into any convenient situation, by the side of the excavation.

In the accompanying drawing (see Plate IV.) fig. 1, represents a sectional elevation taken longitudinally through the carriage, shewing the positions and arrangement of the principal working parts of the machinery. Fig. 2, is a horizontal view of the same, as it would appear if viewed from above, the same letters of reference indicating corresponding parts in both figures.

The parts of the machinery are arranged and erected upon a strong wooden frame *a, a, a,* having longitudinal rails connected by transverse braces. This frame, with the machinery, is mounted upon wheels *b, b, b,* which are to run upon temporary wooden railways *d, d,* laid down on the sides of the line of ground intended to be excavated. These wheels may be of iron, with a flange on the inside of each to guide the carriage in a rectilinear direction, as it runs upon the wooden railway. They are proposed to be about eighteen inches diameter and eight inches wide at the felloe, and perfectly cylindrical, in order to gain sufficient adhesion. Each pair of wheels are fixed upon an axle, turning in suitable bearings under the carriage. At the hinder part of the frame there are another pair of wheels *c,* also of a cylindrical form, but without flanges, which run upon the temporary railway for the support of the carriage and the machinery.

When a certain line of ground has been marked out for excavation, it is necessary to cut slight trenches on each side, or to level the surface of the ground for the purpose of laying down the temporary wooden rails *d, d,* in order that the carriage, with the machinery, may be moved upon a level surface, and advanced gradually without obstruction.

These wooden rails are proposed to be about six inches thick and eight inches wide; and the several lengths may, at their ends, be tenoned and keyed together, or be held fast to one another by any suitable means.

The power, by which the machinery is to be worked and advanced, is proposed to be a steam engine, placed upon the platform *e*, in the front part of the carriage. This driving power is, by any convenient means, to be communicated to the horizontal shaft *f*, and from thence through bevil wheels to the several parts of the machinery.

In beginning to work, a recess must be dug in the ground, equal to the depth of the intended cutting, in order that the machinery may be lowered down and adjusted to its proper working position.

The earth, intended to be removed, is cut or broken up by several series of rotary peckers *g*, *g*, *g*, fixed upon inclined shafts *h*, *h*, *h*, placed at angles of about 25° or 30° from the perpendicular, which must be regulated according to the depth of earth intended to be removed at one cutting. These cutters are shewn detached at figs. 3 and 4, in two positions.

The shafts *h*, of the cutters, are supported at bottom in sockets, formed in a plate *i*, *i*, called the inclined plane, fixed upon wooden framing, attached to the under part of the back of the carriage. Upon these shafts any suitable number of the cutters may be fixed, having sharp hardened steel tools at their ends, which peck into the earth as the shafts revolve.

The plate *i*, forms an inclined plane, upon which the loose earth falls as it is cut, and by the rotation of the arms of the lower peckers this loose earth is pushed off the inclined plane *i*, into the recess behind at *j*, formed by the curved figure of the back part of the plate *i*. From this recess *j*, the loose earth is taken up by a succession of

ledges or buckets, attached to an endless chain passed over rollers.

Toward the hinder part of the frame, two vertical standards *k*, are affixed, which support the axle of the upper roller *l*, of the endless chain of buckets. At the bottom of the vertical standards, running wheels *m*, are attached for the partial support of the machinery, and for pressing the earth level ready for a second cutting, if that should be required.

The endless chain, carrying the series of buckets *n*, *n*, *n*, is extended over a rectangular roller *l*, at top, and under a cylindrical roller *o*, at bottom; the axle of the former of which turns in bearings affixed to the standard *k*, and the latter to the framing near the recess *j*.

The driving power being applied to the horizontal shaft *f*, that shaft gives rotary motion, through its bevil pinion *p*, to a similar pinion fixed on a transverse horizontal shaft *q*, *q*, seen best in fig. 2. Upon this shaft *q*, there are also affixed several smaller bevil pinions *r*, *r*, *r*, *r*, which respectively take into a bevil pinion *s*, made fast on the top of each of the inclined shafts *h*, that carry the rotary cutters. Hence it will be perceived, that by the rotation of the horizontal shaft *f*, the inclined shafts *h*, and the cutters or peckers *g*, are made to revolve, and thereby to peck or cut away the earth against which they are brought into operation.

As, however, this cutting or pecking the earth could not advance unless the machine moved onward, the progressive movement of the frame, with the machinery, is effected by a small bevil pinion *t*, on the shaft *f*, taking into a corresponding pinion fixed on the top of a small vertical shaft *u*, mounted in a bracket and bearing, as shewn in fig. 1. On the lower part of this vertical shaft *u*, another bevil pinion is fixed, which takes into a corresponding pinion, on a small

horizontal worm shaft *v*. The worm on this shaft takes into a toothed wheel *w*, fixed on the axle of one of the pairs of running wheels *b*, *b*; hence the rotation of the pinions above described, produced by the driving shaft *f*, will, through the worm *v*, and wheel *w*, cause the carriage, with the machinery, to be slowly advanced by the rotation of the running wheels upon the railway, and the peckers or cutters *g*, *g*, *g*, continually to be kept up to their work against the unbroken earth.

The rotation of the endless chain of buckets *n*, *n*, *n*, is effected by a bevil pinion, fixed at the end of the transverse shaft *q*, which takes into a corresponding pinion at the end of a lateral shaft *x*, (seen best in fig. 2.) The reverse end of this shaft *x*, has another bevil pinion taking into a similar pinion affixed to the end of the axle of the upper roller *l*, which carries the endless chain of buckets. By this arrangement of machinery, it will be perceived that the rotation of the driving shaft *f*, above described, will cause the axle of the roller *l*, to revolve, and that roller, being rectangular, will, as it revolves, carry round the endless chain of buckets *n*, in the inclined position, shewn in fig. 1.

It will now be seen that the loose earth, broken up by the rotary peckers, as before described, having been pushed off the inclined plane *i*, by the arms of the peckers, into the recess *j*, will there be taken up by the successive buckets *n*, as they revolve, passing through the recess *j*, and that the earth, so taken up, will be discharged from the buckets at top into any receptacle placed under the top roller, as at *y*.

In order that the loose earth thus discharged from the buckets *n*, *n*, may be conveniently removed from the work, an apparatus is attached to the back part of the horizontal rails of the framing *a*, *a*, consisting of a series of shallow

troughs *y, y,* which are made to traverse to and fro, in lateral directions, for the purpose of carrying away the loose earth, and depositing it on the sides of the excavated line or trench.

This apparatus is shewn endways in fig. 1, and in the horizontal view, fig. 2 It consists of a series of boxes or troughs *y, y, y,* connected to an endless chain, passed over two tension rollers *z, z,* and conducted upon several intermediate bearing rollers, which may have pullies at their ends, running upon horizontal rails, as at *a, a,* fig. 1. The rollers *z, z,* are to be furnished with spur teeth, taking into the links of the chain, in order to conduct it, with the troughs, sideways; and the chain may be driven, or a rack on the side of the troughs may be acted upon by a pinion connected through bevil gear with a pinion *b,* fixed at the end of the axle of the roller *l.*

The middle of the chain is made fast to the under part of the framing, so that when the troughs are moved onward in a lateral direction, they may be carried out to a distance from the framing of the machine; and in passing they are filled with the loose earth continually delivered from the buckets. The troughs are then severally turned over and the earth discharged, and when empty they are passed in inverted positions under the series of loaded troughs; and when the troughs have travelled as far as the confined chain will allow, the action of the driving pinion is reversed, and the whole series of the troughs are conducted in the opposite direction, filling as they go on from the buckets, and discharging themselves on the opposite side of the machine.

This part of the apparatus may be worked by various mechanical contrivances for giving reciprocating movements to the series of troughs, which are well understood by machine makers, and therefore do not require further explanation.

If it be desired that the sides of the canal or excavation should be made sloping, that may be effected by applying peckers with longer arms at the upper part of the shafts, and gradually shorter ones toward the bottom, where they must be of the ordinary length, observing that the outer shafts, in that case, should incline outwards.

It must be understood, that the tools with which the ends of the arms are furnished, may vary in form, according to the nature of the soil or earth they are required to remove. Figs. 5, 6, 7, and 8, represent several forms of tools, made of steel, which may be attached to the ends of the arms, suited to the ground to be excavated.

Lastly, I desire it to be understood, that I do not claim the several parts of the machinery as new in themselves, but I claim the form and arrangement of the rotary cutters and their connection with the other parts of the machinery, as described.—[*Inrolled in the Rolls Chapel Office, September*, 1839.]

Specification drawn by Messrs. Newton and Berry.

To James Robinson, *of Huddersfield, in the county of York, merchant, for his invention of an improved method of producing, by dyeing, various figures or objects of various colours in woollen, worsted, cotton, silk, and other cloths.*—[Sealed 27th June, 1838.]

My improved method of producing, by dyeing, various colours in woollen, worsted, cotton, silk, and other cloths, consists in the employment of certain apparatus, by which I stop out or protect any desired portions of the cloth or fabric, whilst it is under the operation of dyeing, in order to produce upon the fabric by such mode of dyeing, what

is technically called savings or blotches, of various shapes or figures. These stopping-out apparatus are not limited as to their forms or dimensions, but may be made in any suitable shapes to cover any parts or portions of the cloth that may be required to be of a different colour from the ground or principal colour of the fabric, and may be applied to the cloth either by hand or by suitable machinery.

I shall first describe the mode by which I construct the apparatus to be applied by hand, and afterwards point out a convenient method of applying the same principles by means of machinery.

In the drawing, (Plate IV.) figs. 1, 2, 3, 4, 5, and 6, represent several forms of blocks, by means of which, I stop out or protect certain portions of the cloth or other fabric during the operation of dyeing, in order to produce savings, blotches, or blank places in the cloth, of a different colour from that of the dyed ground or principal colour.

These stopping-out blocks may be of an infinite variety of shapes, beside those exhibited in the drawings, according to the designs or patterns required to be made on the fabric; but as the mechanical construction of the combined parts of each, and mode of their attachment to the cloth may be the same, whatever the shape of the block itself, it will only be necessary for me to shew the mode by which I find it convenient to construct and adapt each block when I apply them by hand.

Fig. 7, represents, in elevation, one of the hand apparatus, constituting a block, consisting of several pieces put together; fig. 8, is a top view of the same; fig. 9, is a sectional elevation of the lower plate *a*, of the block detached from the upper plate *b*, the plan of which is shewn at fig. 1; fig. 10, is a sectional elevation of the block, complete, the faces of the two plates *a*, and *b*, exactly corresponding in form or shape. In this figure the cloth

or other fabric is seen placed between the upper and lower plates, and the mode is shewn by which the two plates are united and made fast.

In the centre of the lower plate *a*, an upright pin *c*, is fixed, which pin being passed through the thickness of cloth or other fabric, the upper plate *b*, is then placed upon the lower one, taking care that the edges of the two plates perfectly coincide; and for this purpose, a small register pin *h*, may be set in one plate, and made to enter a small socket in the other plate. When these two plates are thus coupled, (the cloth being between them,) a hollow cylindrical piece *d*, shewn detached at fig. 11, is placed over the pin *c*, and made fast to the pin by a small key *e*, passed through slots in both.

The upper and lower plates *a*, and *b*, are by these means held together, and a knob or handle *f*, is then screwed on to the cylindrical piece, in order to secure the parts and cause the plates to press tightly upon both sides of the cloth, as shewn at figs. 7, and 10. In this way, I find it convenient to attach the respective stopping-out blocks to the cloth, of whatever forms or figures they may be, but do not intend to confine myself solely to this mode of attachment.

Such being the construction of the stopping-out blocks to be employed by hand, it remains only for me to shew in what manner I place them to produce a series of blotches or savings in the cloth, in any desired positions or arrangement.

Having determined the figure or design to be produced, the cloth or other fabric is spread or laid out in lengths of two or three yards, or any given quantity at a time, over a stretcher of canvas, which stretcher is placed in a frame and made, for convenience, to turn on an axis or pivot; I then take a suitable number of the plates *a*, and

pass or run all the pins *c*, from the upper side through the cloth and the canvas stretcher, the points of the pins being downwards. This being done, I turn the canvas stretcher, with the cloth and plates upon it, over upon a smooth board or table. The canvas stretcher being then taken off or removed, leaves the plates *a*, at the under side of the cloth or other fabric with the pins *c*, protruding through the cloth with their points upwards. This being effected, the upper plates *b*, are to be put on and secured to the lower plates, in the way above described, by screwing down all their knobs *f*, so as to press the faces of the plates very tightly against the cloth, on both its upper and under surfaces.

The cloth or other fabric being thus made ready, the whole piece, with the stopping-out blocks attached, is to be introduced into the dye vat, pan, or boiler, and there acted upon by the dye, in the ordinary way, until the required ground colour of the piece is properly attained. The cloth is then withdrawn, and partially washed for the purpose of removing the superfluous colour and other matters from its surface, and being spread out on a flat table, the stopping-out blocks are unscrewed and removed, when the portions of the cloth which they covered will be found to have been perfectly protected from the action of the dye, and to remain as blotches or savings from the ground of the tint or colour which the cloth had before the last dye colour was given to it. It is then submitted to a thorough washing or scouring, in the process of which, the small perforations made in the cloth or other fabric by the pins *c*, being passed through it, as already described, are entirely closed up.

The mode of stopping-out, in order to produce blotches or savings in cloth or other fabrics, whilst under the operation of dyeing, by means of hand apparatus, having

been explained, I have to state that such hand blocks or apparatus may be so interspersed or fixed on any part of the cloth or other fabric, as to form and produce singly or collectively, reversely or transversely, a variety of figures, positions, and groupings, (advantages, in certain respects, not so readily attainable by means of my machinery.) I now proceed to shew a method of stopping-out, or producing blotches or savings in cloth or other fabrics, whilst under the operation of dyeing, by means of machinery.

Fig. 12, in the accompanying drawing, represents the plan or horizontal view of a rectangular frame *a, a, a, a,* upon which are fixed two series of perpendicular rods or pillars *b, b, b,* placed in pairs, that is, opposite to each other. On the inner side of each pillar a perpendicular rib or bead is formed for the purpose of confining the horizontal bars *c, c, c.* These bars, (one of which is shewn in its edge view at fig. 13,) carry the stopping-out blocks *d, d, d,* of any desired forms. The blocks *d,* in this instance, represented of a lozenge or diamond shape, are arranged upon and fixed to the bar *c,* by screws or otherwise, at such distances apart as the intended pattern or device may require. As many of these bars *c,* carrying the blocks *d,* and at such distances apart as may be necessary, are placed in a horizontal range in the frame, as fig. 12, a notch in each end of the bar *c,* fitting on to the rib or bead on the sides of the two opposite pillars *b, b.*

The frame with the blocks being so arranged, the cloth or other fabric intended to be operated upon, is extended, either single or double, over the frame in the direction from A, to B, and when it has been laid smooth and stretched over a tension rod *e, e,* other bars *d,* having corresponding blocks *c,* are laid upon the cloth and fixed in their positions between the pillars *b,* as before described.

The cloth is then folded back tightly over the tension rod *e*, and stretches out smooth in the opposite direction, that is, from B, to A, covering the blocks as before, and another series of bars and blocks are placed upon it in like manner; after which, the cloth is again folded over another tension rod *f*, *f*, and extended in the same way from A, to B, when a similar series of bars and blocks are placed in coincidence with the former; and so on until the whole length of the piece of cloth has been lapped fold over fold, having corresponding bars and blocks between each fold, piled one above another, as shewn in the vertical section of the machine, at fig. 14.

The folding of the cloth, in the manner described, being completed, a strong plate or frame, or bars *g*, *g*, *g*, are laid upon the piles of blocks and cloth, and firmly screwed down upon the pillars so as to confine all the blocks, and cause them to press tightly those parts of the cloth with which they are in contact.

The rods *e*, and *f*, being withdrawn from the folds of the cloth, the frame with the piles of blocks and cloth, or other fabric, secured together, as described, is now to be carried to the dye vat, pan, or boiler, and immersed therein, where it must remain until the dyeing operation is complete. After dyeing, the whole must be properly washed to remove the superfluous colouring and other matters, and the cloth or other fabric being unfolded, and the bars with the blocks withdrawn from the frame, those portions of the cloth or other fabric, which have been protected by the blocks, will be found not to have been affected by the last operation of dyeing, but to have remained as blotches or savings from the ground colour, in the tint or condition in which the cloth was previous to its introduction into the dyeing vessel.

Lastly, I desire it to be understood, that I do not intend

to confine myself to the precise forms or construction of apparatus set forth in the drawings hereto annexed, and above described; but claim the invention and exclusive use of stopping out blocks or plates, and the above or any other modes that may be found convenient for attaching or applying stopping-out blocks or plates to cloths or other fabrics, which may be capable of preventing or resisting the action of dyeing matters upon certain portions of the cloth when submitted to the dyeing operation, in order to produce in the fabric, what are technically called blotches or savings from the colour in which the fabric is immersed and dyed.—[*Inrolled in the Rolls Chapel Office, December*, 1838.]

Specification drawn by Messrs. Newton and Berry.

To John Read, *of Regent-street, in the County of Middlesex, merchant, for certain improvements in machinery or apparatus for raising or forcing fluids.*—[Sealed 19th August, 1833.]

This invention is a peculiar arrangement of the valves and passages of a pump for raising water and other fluids.—

Plate V. fig. 1, shews a section of the pump; *a, a,* is a cylindrical barrel; and *b*, a piston, working within it: *c, c,* is a cylindrical case enclosing the pump barrel *a*, which cylindrical case is to form an air vessel, opening only to the chamber *d*. A spherical valve *e*, which is the induction valve, has its seat in the bottom of the outer case, and on rising, allows the water to pass from a reservoir below into the lower part of the cylindrical case, shewn at *f*; and a ball valve *g*, on rising, admits the water from chamber *f*, into the chamber *d*.

By the descent of the piston, a partial vacuum will be

formed in the upper part of the pump barrel, which will cause the valve *e*, to rise, and the water from the reservoir to flow into the lower part of the case *f*, and up the vertical pipe *h*, into the pump barrel *a*. On the piston rising again, the water so occupying the upper part of the pump barrel, will be expelled and forced down the pipe *h*, when the valve *e*, closing, the force of the water will raise the valve *g*, and pass into the chamber *d*. The piston then descending again, will cause the valve *e*, to open, and a fresh supply of water to pass into the case, and up the pipe *h*, as before; and on the piston again rising, this volume of water will be expelled and driven through the valve *g*, into the chamber *d*, and up a vertical pipe *i*, to its discharging aperture at top.

In order that the flow of water through the pipe *i*, may be continuous during the reciprocating action of the piston, the elasticity of the air in the cylindrical case is allowed to act upon the surface of the water in the chamber *d*, in the same way that the air in the vessels of pumps usually do act; and an under communication formed by an opening from the chamber *d*, admits water into the pump barrel below the piston, which will not interfere with the working of the valves.

The patentee has proposed to employ a modification of this plan for the construction of an injecting syringe or stomach pump, for medical purposes; but since the inrolment of his specification, he has discovered that the use of an air vessel for such a purpose, might be injurious,—he has therefore petitioned the Attorney-General for leave to disclaim the use of an air vessel, in the latter case, and only retain the arrangement of valves described above.—[*Inrolled in the Inrolment Office, February,* 1834.]

To John Robertson, *of Crofthead, in the parish of Nielston, in the county of Renfew, cotton spinner, for his invention of certain improvements in the mule, jenny, or other machine, for the spinning of cotton; and in the billey, stretching frame, or other machine, for the roving of cotton; and in the machinery for spinning and roving of silk, wool, flax, hemp, or other fibrous substances.*—[Sealed 21st September, 1833.]

The subject of this patent is one of the attempts to render the spinning mule self-acting; that is, in which those parts of the operation of drawing out and putting up the mule carriage, and guiding the yarns on to the cops or spindles, instead of being effected by the hands of an expert spinner, are performed by the mechanism alone,—all the parts of the machine being driven by the agency of one rotary axle.

The patentee employs the constructions and forms of most of the parts of an ordinary spinning mule, but has introduced as his novel feature, a mechanism by which the few coils of yarn wound round the top of each spindle, when the carriage has finished the stretch, are to be drawn off the points of the spindles, instead of the old mode of reversing the action of the spindles, called the "backing-off motion," which it is necessary to do before the yarns can be wound uniformly upon the cop.

The mechanism employed, is an arrangement of compound levers, worked by reciprocating straps, connected to some of the rotary parts of the machine, which at the proper time cause a horizontal rod to rise and draw the coiled ends of all the yarns up from the points of the spindles, and hold them in distended and straight positions, ready for the fallen wire to guide them on to the cop, when the winding on is performed.

This contrivance, which will be readily understood by any practical spinner, does not appear to us of sufficient

general interest to render a graphic representation of that elaborate machine, the mule, necessary in our Journal, and without which it would be impossible to describe the details of the contrivance.—[*Inrolled in the Inrolment Office, March,* 1834.]

To JOHN SCOTT HOWARD, *of Chow, Bent, in the county of Lancaster, machine maker, for his invention of certain improvements in machinery, called roving frames, for roving cotton and other fibrous substances.*—[Sealed 21st September, 1833.]

THIS is a modification of Mr. Bodmer's mode of copping untwisted rovings of cotton, and other fibrous materials, upon bobbins, in a close and compact form.

The filaments of cotton, constituting the rovings, after being drawn by the drawing rollers as usual, are carried forward between conducting rollers, and passed through trumpet guides to the peripheries of a series of bobbins, placed below on horizontal axles. The axles of these bobbins turn in stationary bearings, and the peripheries of the bobbins bear upon the surface of an endless band of leather, which as it travels along in front of the machine, gives to the bobbins rotary motions on their axles, and thereby causes them to take up or wind on the rovings, in a compact state, as they descend from the guides and driving rollers.

The novelty in this case, consists in the peculiar arrangement of toothed gear and other machinery, by which the band and conducting rollers are driven.—A machine very much the same in its elementary parts, but driven by another construction of machinery, was the subject of a patent granted to Mr. Richard Simpson, as the representative of the inventor, a foreigner, then residing abroad. (See Vol. V. of our present Series, p. 250.)—[*Inrolled in the Inrolment Office, November,* 1833.]

To James Lees, *of Salem, near Oldham, in the county of Lancaster, cotton spinner, for his invention of an improvement in the machinery for spinning, twisting, and doubling cotton, silk, wool, hemp, flax, and other fibrous materials.*—[Sealed 17th December, 1838.]

The object of this improvement in the machinery for spinning, twisting, and doubling cotton, silk, wool, hemp, flax, and other fibrous materials, is to spin, twist, and double at a greater speed than can be done by ordinary spinning, twisting, and doubling machinery; and which object I effect in the following manner,—reference being made to Plate V., in which fig. 1, is an elevation of that portion of a spinning or doubling frame or machine, which is the subject of my improvement, the same being shewn detached from the spinning or doubling frame or machine, and arranged or combined according to my improvement; fig. 2, is a vertical section, taken through the same; and fig. 3, a side elevation of the same.

I use a spindle *a, a,* made stronger than ordinary, and having a thin plate *b,* attached to its upper part, as a support to the bobbin *c,* and to the washer *d*; and the spindle is supported at its foot by a step *e,* fixed in a copping rail *f,* which copping rail causes the spindle to traverse up and down; and the spindle is also guided and steadied, a little above its middle, by a collar or bolster *g,* fixed in a fast rail *h*; and the spindle is allowed to revolve in its said step and collar freely.

I use the fixed collar or bolster *g,* to guide and steady the spindle; and having its top made flat and thin for a bearing, I use a flyer *i, i,* the arms of which point upwards, and which arms are made to taper sufficiently from their neck to their upper extremities, and are unconnected at

their upper extremities, and are there each furnished with the usual delivering eye to guide the yarn on to the bobbin; and also with an extension of the arm beyond the usual delivering eye, and with a hook upon the top of such extension, which extension and which hook are for the purpose of regulating the drag upon the yarn, in the same manner as it is now regulated in ordinary flyers, whose arms point downwards, namely, the same being regulated in ordinary flyers by passing the yarn, one or more times, round the arm of the flyer, as the case may require; and, in this instance, by passing the yarn, one or more times, round the extension of the arm, as may be necessary.

I use a tube *j*, *j*, the bottom of which is for a bearing, and is for that purpose made flat and thin; and which bearing, when the tube is placed upon the spindle, bears upon the top of the fixed collar or bolster, and is made of equal size to the same.

I use a warve *h*, which is made flat at its top, so that the bottom of the stem or neck of the flyer may fit close to this top, and which warve is also made dished at its bottom.

I use a bobbin, which has its two ends made alike; and which has its bush, which is within its barrel, and with which it embraces the spindle. When this bush is made of wood, it is made the entire length of the bobbin.

I fix the above described flyer, by its stem or neck, upon the afore-named tube *j*; and I also fix upon this tube the above-named warve *k*; and I fix the bottom of the stem or neck of the flyer also upon the tube *j*, in close contact with the top of the warve. The flyer, tube, and warve, so fixed together, I place upon the above described spindle, to revolve around it, and to be by it kept steady whilst they revolve around it; and the spindle at the same time being loose, and the afore-named flyer, tube, and warve, so

fixed together as aforesaid, I place upon the above-named spindle, in such a manner, that the bottom of the tube bears upon the top of the fixed collar or bolster, and the warve, and the stem or neck of the flyer are brought as near to the said top of the fixed collar or bolster as can be, so that the flyer, warve, and tube, may revolve upon the steadiest part of that portion of the spindle which is above the fixed collar or bolster, and which part is most able to resist a shake or pull.

I place the bobbin upon the upper part of the spindle, or upon that portion of the spindle which is above the thin plate, so that the bobbin, when pulled round by the thread, revolves upon the spindle, and bears upon the washer, as is usual. The bobbin has its bush, which is within its barrel, and with which it embraces the spindle;—when this bush is made of wood, it is made the entire length of the bobbin, in consequence of there being more friction upon this bush than upon the bushes of the bobbins of the present common spinning and doubling machines, by reason of the spindle, in this instance, running much slower than the bobbin.

The pull requisite to cause the flyer, tube, and warve, to revolve rapidly upon the spindle, will also cause the spindle to revolve with them, but at a less speed; and when the spindle revolves, it will always keep the bearings which are upon the top of the fixed collar or bolster, and upon the bottom of the tube, supplied with oil, so long as there is the least oil upon that portion of the spindle which passes the bearings, during the whole course of the traverse of the said spindle.

In spinning with flyers, whose arms point upwards, as those I use do,—it will be found advantageous to place between and behind each flyer, a plate or guard of tin or other metal, to prevent each thread, when it breaks, from

lashing the others. For this purpose, I use tin plates or guards, which extend from the wire board, which they touch, to as low as the eyes of the flyer, and project about an inch beyond the sweep of the arms of the flyer.

Thus, by the above described arrangement and combination of the above described parts, I am enabled to run the flyer, and to spin, twist, and double, quicker than can be done by ordinary spinning, twisting, and doubling machinery.

Having now particularly described the object of my invention, and the manner of carrying the same into effect, I would declare, that many parts have been necessarily shewn and described by me to which I make no claim, save in so far as they form a part of my particular arrangement, construction, and combination of parts, as shewn in the drawings, for carrying the object of my said invention into practical effect, and to which I consider myself entitled, by virtue of my letters patent.—[*Inrolled in the Rolls Chapel Office, May,* 1839.]

Specification drawn by Messrs. Newton and Berry.

To DAVID CHEETHAM, *junior, of Hollin's Mill, Staley Bridge, in the county of Chester, cotton spinner, for his invention of certain improvements in the machinery applicable to the preparation of cotton and other fibrous substances, for the purpose of spinning.*—[Sealed 5th June, 1838.]

THESE improvements in the machinery applicable to the preparation of cotton and other fibrous substances, for the purpose of spinning, consist in the employment of certain mechanism or apparatus for conducting the sliver of cotton

or other material direct from either the carding engine or drawing frame, (usually employed in the preparation of the material previously to spinning,) and winding or coiling the same upon bobbins, or into cylindrical forms, instead of delivering the sliver into cans, as usually practised. By these methods of preparing the cotton or other material, for the roving and spinning process, the labour is considerably diminished, and the sliver placed in a much more convenient and desirable form, for the purposes of roving and spinning, than when it has been packed into cans, as hitherto commonly practised.

My improved mechanism or apparatus, to be employed for the first-mentioned of these purposes, is represented in Plate VI., in which, fig. 1, is a front elevation of the apparatus; fig. 2, an end view; and fig. 3, a plan or horizontal view of the same, as seen from above. In these figures it will be seen, that similar letters of reference are marked upon corresponding parts of the mechanism; and I wish it to be observed, that the apparatus is supposed to be placed immediately in front of the delivering rollers of either an ordinary carding engine or drawing frame, as employed in cotton manufactures, in the situation usually occupied by the cans in this part of the preparation process.

The stationary standard frame-work *a, a, a,* supports the horizontal shafts *b, b,* and *c, c.* Upon the shaft *b, b,* the bobbin frame or sliding carriage *d, d,* is mounted;—this carriage *d,* supports the pivots or axle of the bobbin *e,* in segmental slots, upon which bobbin the sliver of cotton is to be wound, as it comes from the trumpet guide. The bobbin bears upon the surface of the revolving roller *f,* and is turned upon its axis by the friction of the two surfaces.

In order that the method of conducting, laying, and

winding the sliver on to the bobbin, may be clearly understood, I have represented, in figs. 2 and 3, at *g*, *g*, the delivery rollers of either a carding engine or drawing frame, where the sliver *h*, is seen passing to the bobbin *e*, through the trumpet guide *i*, and presser lever or finger *j*, which presser lever is shewn detached in two positions, at figs. 4 and 5. It will be observed that the end of the lever bears against the periphery of the roller *f*, and that the lever is weighted, so that any amount of pressure may be put upon the sliver as it passes through the eye, and under the end of the lever, to the bobbin, without bringing the finger *j*, against the surface of the bobbin.

The spur wheel *k*, taking into a pinion *l*, fixed on the shaft *c*, is to be put into gear with the carding engine or drawing frame, to which this improved bobbin frame is connected; when through the pinions *m*, upon the shaft *c*, and the wheel *n*, upon the shaft *b*,—the shaft *b*, will receive rotary motion, and communicate that motion to the surface roller *f*, which will then, by the friction of the surfaces, cause the bobbin *e*, to revolve, and, consequently, wind on the sliver conducted by the lever or finger *j*.

In order to lay the sliver in helical coils upon the bobbin, the whole of the carriage *d*, *d*, with the bobbin *e*, and surface roller *f*, is made to traverse or slide upon the shafts *b*, *c*, to the extent of the required length of the bobbin. This is effected through the agency of the pinion *o*, upon the end of the bobbin spindle, which works into a spur wheel *p*, mounted upon a stud at the side of the sliding carriage *d*. Upon this wheel the bevil pinion *q*, is fixed, which takes into a similar bevil pinion, on the top of the shaft *r*. The lower end of this shaft has a pinion *s*, taking into a rack *t*, which is fixed upon the framing *a*, *a*, in front of the machine. Hence, the rotation of the shaft *r*, and pinion *s*, taking into the fixed rack *t*, causes the carriage *d*,

with the bobbin, &c., to slide to and fro, in front of the trumpet guide *i*, and delivering rollers *g*, as they present the advancing length of sliver; and by these lateral movements, in conjunction with the rotary movement, before described, cause the sliver to be wound upon the bobbin, in uniform helical coils, from end to end of the bobbin.

It will readily be perceived, that as the bobbin is driven by the friction of the surface roller *f*, its smaller diameter, when the bobbin commences to wind on the sliver, will revolve much faster than when the bobbin has become nearly full; consequently a self-adjusting differential motion is obtained, which accommodates the taking up speed of the bobbin to its increasing diameter; the delivery of the sliver from the carding engine or drawing frame being always uniform,—and as the spindle or shaft of the bobbin runs in curved or segment slots *u*, in the carriage, the bobbin is allowed to rise as the sliver accumulates upon it; and the spur wheel *p*, is kept always in gear with the pinion *o*, upon the bobbin end.

Another feature of my invention is represented in fig. 6, which exhibits an ordinary roving bobbin *v*; but I vary the usual method of mounting the bobbin in the creel;—I indent the ends of the bobbin spindle at *u*, and have a pointed stud or pin *w*, fixed upon the creel rail for the bobbin to be supported and turn upon, instead of the common mode of allowing the pointed end of a bobbin spindle to turn in a cup or recess in the creel rail. By this improvement the spindle ends will be protected in the event of falling, and the bearing be preserved instead of broken off, as is very commonly the case in the old mode, when the bobbin is rendered useless.

The other mode which I employ for winding or coiling slivers of cotton and other materials into cylindrical forms, is a modification of the former mode, wherein, instead of

winding the sliver in helical coils upon a horizontal spindle or barrel, as before,—I wind them, in this apparatus, in convolute coils round a vertical spindle.

Fig. 7, represents, in elevation, two upright spindles *a, a,* answering to the bobbins in the former machine. One of the end discs *b,* is made fast upon the spindle,—the other disc *c,* is loose, and capable of sliding upwards, as the coiled material accumulates, by successive laps between them; and instead of causing the material, as it coils, to revolve upon a friction or surface roller, I now place the friction or surface roller *d,* upon the coiled material.

The two friction or surface rollers *d, d,* are fixed upon a sliding horizontal shaft *e, e,* which is capable of moving to and fro in brackets or bearings, extending from a frame *f, f, f, f,* for the purpose of traversing the rollers *d, d,* from the centre to the circumference of the discs *b, c,* and vice versa. This frame *f,* is also enabled to slide, but in vertical directions, up and down, upon its standards *g, g,* in order to adjust or accommodate the rollers to the height or thickness of the cylindrical mass of coiled material.

The driving power, by which the machine is to be actuated, may be applied in any convenient way to the horizontal shaft *e, e,* as by a band and pulley *h,* having a tightening roller, or by any gear connected to the carding engine or drawing frame, or in various other modes, well known to mechanics. The shaft *e,* being by these means made to revolve, in accordance with the speed with which the sliver is delivered,—the rollers *d, d,* will also revolve with the same speed,—and the slivers conducted from the carding engine or drawing frame, through the trumpet guides *i, i,* will pass through a slot in the upper disc *c, c,* under the roller *d, d,* and be made to lap upon the faces of the lower discs *b.*

The upper discs *c, c,* as before said, are enabled to slide

upon the spindles *a, a,* but are prevented from revolving with the spindles and lower discs *b, b,* by arms *k, k,* connecting the upper discs with the frame *f.*

The periphery of each roller *d,* acts in the slot of the upper disc, and is thereby enabled to come in contact with the face of the lower disc, or with the material lapped upon it; hence, as the rollers *d,* revolve, the friction of their surfaces produce the rotary motions of the lower discs and their spindles; and cause the slivers of cotton or other material, as they are delivered from the trumpet guides, to be laid down flat by the rollers upon the faces of the lower discs. At the lower part of one of the spindles *a,* there is a pinion *l,* taking into a wheel *m,* mounted upon a stud at the bottom of the machine. This wheel carries an excentric or heart cam *n,* the periphery of which acts against two studs or antifriction rollers *o, o,* attached to the under part of a horizontal sliding bar *p, p.* To this bar a perpendicular forked rod *q,* is affixed, which fork embraces a pulley *r,* made fast on the sliding shaft *e.*

Now it will be perceived, that as the spindle *a,* revolves, the wheel *m,* will be made to carry the cam or heart wheel *n,* round, which, acting against the sheds or rollers *o, o,* will cause the bar *p,* to slide to and fro, and with it the forked rod *r,*—and consequently, to give the slow reciprocating movement to the sliding shaft *e,* and also to the trumpet guide, which will traverse the rollers *d, d,* and the slivers of material, from the edge of each disc *b,* towards its centre, and vice versa. By that means, the slivers of cotton or other material, will be laid upon the discs *b, b,* in convolute curves; and as the machinery continues thus operating, the successive convolute layers of sliver will be lapped one upon the other, until the cylindrical mass of material is of the required height or thickness,—the sliding

discs *c, c,* being raised upon the spindles, by the accumulation of the material between the upper and lower discs.

I may add, that in order to prevent the weight of the frame *f,* with the shaft *i,* through its rollers *d, d,* bearing too heavily upon the slivers of cotton or other material lapped upon the disc *b, b,*—I may find it necessary to apply a counterpoise weight to the carriage *f,* which may be done by any ordinary means that shall be found most convenient.—[*Inrolled in the Rolls Chapel Office, December,* 1838.]

Specification drawn by Messrs. Newton and Berry.

To CHARLES WYE WILLIAMS, *of Liverpool, in the county of Lancaster, gentleman, for his invention of certain improvements in the processes or the mode of purifying or preparing turpentine, rosin, pitch, tar, and other bituminous matters, whereby the power of giving out light and heat is increased, either when distilled or burnt as fuel.*—[Sealed 14th August, 1838.]

THIS invention consists in a peculiar mode of rendering the several bituminous matters, as turpentine, rosin, pitch, tar, &c. more effective, when used for the purpose of giving out either heat or light, by bringing such bitumens into intimate contact with atmospheric air, in order that several of the gases with which they are charged, and in particular the combination of ammoniacal gas, known to be injurious in the processes of burning for the production of light or heat. In order to afford the best information for carrying my said invention into effect, I give the following description of the process or means which I employ, namely:—I

place the bitumen to be purified in a large pan, or vessel, over a fire,—and when raised to near the boiling point, I cause a second vessel, shaped and pierced with numerous holes, like a colander, to descend into the former; and when filled with the melted bitumen, to be raised suddenly a few feet, to allow the melted stuff to fall through in shower-like streams, by which, in the act of dripping down and returning to the first-mentioned pan, the melted material comes into extended contact with the atmosphere; the result of which is, that a large portion of the ammonia, and its combinations, and other gases, with which such bitumens are charged, are expelled or drawn off by the atmosphere.

This filtering or mixing process, by which the bitumen and atmospheric air are so brought in contact, is to be kept going on, until the material has received the required extent of purification, and which operation may be carried on as long as desired.

This process of lifting the bitumen, and allowing it to fall through the colander or other shaped vessels, pierced full of holes, may be effected by mechanical means, or simply by hand utensils.

The temperature to which the bitumen must be brought, should be about the boiling point; but varying, of course, according to the kind of bitumen operated on, and which a little practice will soon point out.

While this process is going on, I cause a strong current of atmospheric air to pass across the falling portions, drops, or streams of the bitumen, by means of a fan or other well known mechanical means,—the object being to cause a larger admixture of air with the bitumen, in the act of falling or dripping down, and by which the ammoniacal and other gases, which are very volatile, are passed off in great quantities.

I do not intend to confine myself to bringing such bitumens

to any particular temperature, or to continue this filtering or mixing process for any particular length of time; but intend to avail myself of any extent or continuance of this operation, until the air has sufficiently acted on the bitumen, with which it is thus mechanically brought into contact.

And whereas, the process of purifying the various bitumens above described, has been practised by other persons, I make no claim to purifying such materials by any other means; but I do claim that mode of purifying the same, by agitation and mechanical admixture with atmospheric air, and for the purpose of exposing extended surfaces of the bitumen to contact with atmospheric air.—[*Inrolled in the Rolls Chapel Office, February,* 1839.]

Specification drawn by the Patentee.

To JOHN WILLIAMSON WHITTAKER, *of Bolton, in the county of Lancaster, joiner, and* ROWLAND HALL HEATON, *of the same place, cotton spinner,—for their invention of certain improvements in the means of connecting or uniting straps or bands, for driving machinery, and other similar purposes; and in the apparatus for effecting the same.*—[Sealed 20th May, 1839.]

THESE improvements consist, firstly, in the employment of metallic tags, staples, or fastenings, for the purpose of securing the joint connection or "piecing" of machine and other driving straps, belts, or bands. It is well known that such straps, belts, or bands, have to be produced of various lengths, to be adapted to the several purposes for which they may be required; and that such straps, belts, or bands, have to be cut in certain breadths, from hides or

skins, of limited dimensions, so that in order to produce a strap of any length, these strips of leather have to be pieced or united at their extremities; this operation is usually performed by over-lapping a certain portion of each end of the straps, and either stitching them together, and so performing the required joint, or by a more expensive process of screws, nuts, or rivets, which has been lately introduced for the purpose.

Now our improvements not only form a much more secure joint, connection or piecing, but with greater economy and expedition, as the two ends of the leather have to be cut square, and merely placed in contact with each other, making what is termed a "pimp joint," instead of wasting so much of the leather strapping, as the over-lapping in the usual manner requires.

The great facility and dispatch with which such operation can be performed by our improvements, is also a very material object,—as in the event of a driving strap or band breaking during the operation of any machine, the impediment or stoppage of the work is only momentary, instead of being that of half an hour or more.

Secondly, our improvements consist in the machinery or apparatus by which such joint, connection or piecing, is performed; that is, the peculiar contrivance and arrangement of mechanism for manufacturing such metallic tags, staples, or fastenings, and also the machinery or apparatus, by which such metallic fastenings are made or caused to unite, or piece the straps. But as the operations will be much better explained with reference to the two sheets of drawings attached to these presents, we will proceed to describe the various figures contained therein, which it will be seen are marked with figures and letters of reference, similar letters being placed upon corresponding parts of the machinery.

A machine or apparatus for making the tags or staples,

is shewn in Plate VI.; fig. 1, is a plan or horizontal view; fig. 2, a vertical section, taken at the line A, B, in fig. 1; and fig. 3, another vertical section, taken through the machine at the line C, D, in fig. 1. In this machine, which is to be driven by power, and is otherwise entirely self-acting, the tags or staples are formed in a more finished and complete state, and are represented at fig. 4, where it will be seen that the ends are made taper or pointed, in order that they may lie perfectly flat upon the strapping, and not require filing or finishing.

The operation of this apparatus, is as follows:—Upon the main driving shaft *a*, *a*, which is mounted in the general framing *b*, *b*, *b*, *b*, are keyed the driving pulley *c*, the cam *d*, and the two excentrics *e*, *f*; the wire *g*, *g*, from which the tags or staples are to be formed, is fed into the machine through the guide *h*, and immediately embraced by a clip lever *i*, *i*, and at every half revolution the shaft *a*; the enclosed plane upon the cam *d*, acts against the reverse head of the lever *i**, which vibrating upon its fulcrum at *j*, advances the wire into the machine progressively, the length of the tag being adjusted by means of the set or adjusting screw *k*. Now the excentric *e*, acting upwards against the end of the lever *l*, of course depresses the reverse end *m*, which is formed with cutting teeth, in order to indent or cut out the wire in the required form of the taper or sharp ends of the tags or staples; this notch or indention having been produced, the wire is again advanced as before, when the action of the excentric *f*, causes the lever *m*, to advance and cut off the length of wire intended for the tag or staple, and after cutting it off, the continued advance of bar *n*, carries the staple against the end of the bar *o*, and presses the ends of the wire forwards into the positions shewn in dots in fig. 1, when they are finished and allowed to drop out of the machine quite ready for use.

Our improved mechanism or apparatus for joining or piecing the straps is shewn at fig. 4, which is a top view of the machine complete, with the strapping shewn under operation; fig. 5, is a side elevation; fig. 6, a vertical cross section; and fig. 7, another plan or horizontal view, with the top parts thrown back upon their hinges, in order to expose the interior.

This machine principally consists of a bed or framing *a, a,* (bolted down to the bench,) a grating *b, b,* two parallel moveable bars or plates *c, c,* a midfeather *d, d,* and top levers or holdfasts *e, f, g.* The operation is to be performed as follows:—After the two ends of the straps to be joined or pieced, have been properly squared, one of them is to be placed with its square end against the centre line of the machine over the midfeather, and placed upon the grate *b*; the top lever *e,* is then to be turned over upon its hinge joint, in order to hold or secure that end of the strap; the other squared end of the strap, is then also to be laid over the grating, and in contact with the first; the other top lever *g,* is then to be turned over it, in order to hold it in its place.

A small punch or piercer, shewn in fig. 8, is now to be passed down the grooves *l, l, l, l,* as shewn in dotted lines, in fig. 6, for the purpose of piercing the strap ends; the tags or staples are next to be introduced, and then the centre top lever or holdfast is also to be turned over, and the whole fastened down by turning the small handle *h,* which has an inclined plane *i,* upon its boss, and will thus tighten the three levers *e, f, g,* and hold them down (securing the strap ends) by means of the button *k.* The long lever *m, m,* is now to be pulled in the direction of the arrow, which, by turning upon its fulcrum end, will, by means of the two flat links *o, o,* bring the two parallel plates or bars *c, c,* towards the centre or midfeather, and thus turn up the ends of the tags or staples, and complete

the joint or piecing, as seen in the section fig. 6. It must be particularly observed, that the plates *c*, *c*, in this machine, must have notches or grooves *z*, *z*, formed in them to facilitate the turning up and finishing of the ends of the staples or tags.

We would recommend that the joint or piecing should be composed of a long and a short staple, put in alternately, as it assists the pliability of the strap in passing small pullies or drums, similar to the joint shewn in fig. 9; and in this case, after the short staples have been put in and completed, the strap must be advanced half the distance of the staples, and the longer staples put in at another and similar operation of the apparatus. To accommodate this arrangement, grooves *p*, *p*, are formed in the under side of the top lever *f*, for the purpose of holding the staples within such recesses; and set screws *q*, *q*, are also provided, in order to adjust the height of these top levers to any thickness of strapping.

Having now particularly described our improvements in the means of connecting straps or bands, and in the apparatus for effecting the same, we desire it to be understood, that we claim, as our invention, and which is secured to us by virtue of the above recited letters patent,—the use or employment of the metallic tags, staples, or fastenings, for the said purpose; and also the machinery or apparatus by which such tags are made; and also the various apparatus or mechanism for performing the operation of joining, connecting, or piecing straps, by such means as are shewn in the drawings, and herein particulary described, without being confined to their precise dimensions or materials, or any other slight modification of the same.—[*Inrolled in the Rolls Chapel Office, November*, 1832.]

Specification drawn by Messrs. Newton and Berry.

To William Banks, *of Spring Hill terrace, near Birmingham, in the county of Warwick, manufacturer, for his invention of a certain improvement in machinery, pens, and presses, for ruling and pressing paper.*—Sealed 17th August, 1835.]

This invention is a certain arrangement of machinery whereby paper may be ruled with lines of different colours, and submitted to hot or cold pressure at the same time.

The apparatus described in the specification, consists of a frame-work constructed of wood, iron, or other suitable material, and having at one end a flat table for holding the paper to be ruled and pressed. At the end of this table, and about the centre of the framing, two hollow rollers are placed, transversely, across the machine, and are mounted in suitable bearings, and are intended to press the paper.

Near these hollow rollers a cylindrical shaft or spindle (also placed transversely) is furnished with a number of instruments or pens for making the required lines. These pens are capable of very accurate adjustments, as to the widths and thickness of the lines to be produced; and each pen is attached to a metal collar, which may be slidden along the cylindrical shaft, and firmly fixed in any required situation or position, by means of a small thumb-screw attached to it.

Two metal or other rollers, one placed near the pressing rollers, and the other at the reverse end of the machine, carry tapes or bands for the purpose of keeping the paper, while being ruled, flat upon a wide endless band, which is extended across two rollers, placed below the tape rollers. A third roller, immediately under the points of the pens, raises up the endless band, and by that means keeps it in

contact with the points, and also forms a solid and firm bed for the pens to act upon.

The paper to be ruled being placed on the table in front, is passed, sheet by sheet, between the hollow pressing rollers, which may, if required, be heated by means of hot irons. It is then conducted from them by the tape roller, and passed on to the endless band, and carried by that and the tapes under the points of the pens, from which it receives the required lines; it is thence carried forward by the tapes and endless cloth, and delivered at the other end of the machine on to a table, placed there for the purpose of receiving it.

The machine is set in motion by manual or other power, which is applied to one of the pressing rollers; the other parts of the apparatus being actuated by suitable gearing, or otherwise.

The pens are formed in such a manner that they will contain a sufficient quantity of ink to last for a considerable space of time without replenishing; and each instrument being totally unconnected with any other, two, three, or more coloured lines may be ruled at one and the same time.—[*Inrolled in the Rolls Chapel Office, February,* 1836.]

To George Nelson, *of Milverton, in the county of Warwick, chemist, for his invention of a new or improved method, or new or improved methods of preparing gelatine, which has the properties of or resembles glue.*—[Sealed 23rd March, 1839.]

This invention is described as consisting of an improved mode of preparing gelatine from the cuttings and trim-

mings of hides and skins, and is thus explained:—The cuttings, after been freed from the hair, fat, and other extraneous matters, are to be well washed in clear cold water. When sufficiently clean, the cuttings are to be submitted to the action of a solution of caustic alkali, made from common soda and fresh burnt lime, mixed with water. Previous to their being macerated, they should be scored all over to the depth of about the eighth of an inch, in order to facilitate the action of the alkali, in which they may be allowed to remain for about ten days; they should then be removed from the solution, and placed in an air-tight vat, lined with cement, and kept at a temperature of from sixty to seventy of Fahrenheit; after which they must be removed to a washing apparatus, consisting of a wooden cylinder, about three feet in diameter, which is made to revolve. A stream of water, being admitted into the cylinder, washes away all the alkali from the cuttings; and when sufficiently cleansed, they are removed to a wooden vessel, and submitted to the action of sulphurous acid gas, generated by the cumbustion of sulphur.

After this process, the water should be pressed out of the cuttings, and they are then to be put into vessels, made of any material not liable to be acted upon by the acid,—such as earthenware,—and heated by steam, to the temperature of 150° Fahrenheit,—thus completing the process, the cuttings being then reduced to a gelatinous state. This product must be strained, in order to separate the pure gelatine from its residuum; and during this process, the gelatine is kept up to 100 or 120° of Fahrenheit.—*Inrolled in the Inrolment Office, September,* 1839.]

To THOMAS BONSOR CROMPTON, *of Farnworth, in the county of Lancaster, for certain improvements in the manufacture of paper.*—[Sealed 6th April, 1839.]

THIS invention consists of a new method of producing a vacuum in the wire cylinder, or in the vacuum box under the wire cloth, over which the paper passes in the course of manufacture.

The patentee produces a vacuum by means of a number of rotary fans placed in connection with the vacuum box, and which being made to revolve at a considerable velocity, exhaust the air in a continuous current.

The water contained in the paper is extracted from it, as it passes over the wire cylinder or wire cloth, by means of the air which presses on the surface of the paper as it endeavours to fill up the vacuum formed below. The water thus extracted is drawn off from the vacuum box by a syphon.

The patentee states, that paper made in apparatus with his improvement attached thereto, will be found to be more even and regular in thickness than that which is made in a machine where the vacuum is caused by the reciprocating motion of a pump;—the thickness of the paper being rendered irregular by the uneven pressure of the atmosphere on its surface, occasioned by the air being exhausted in puffs.—[*Inrolled in the Inrolment Office, October,* 1839.]

The Specification of John Wright's Patent, referred to in Plate V., is unavoidably deferred until our next Number.

To WILLIAM JOYNSON, *of St. Mary Cray Paper Mills, Kent, for a certain improvement or improvements in the manufacture of paper.*—[Sealed February 21st, 1839.]

THIS patent is for a method of producing the water-mark, or maker's name, on paper. The method of effecting this may be thus explained:—

Projecting letters, figures, or devices, made of round or oval wire, are fixed to the dandy roller, which is a cylinder formed of an axle, having arms or rings projecting from it, and covered with wire cloth. The figures or letters are formed of wire, flattened on the side, by which they are attached to the roller, but having the upper side, or that which makes the indentation in the paper, of a round form.

The paper, in a pulpy state, being passed over this cylinder, is marked in those places that come into contact with the projecting devices, and form what is generally known as the water-mark.—[*Inrolled in the Rolls Chapel Office, August,* 1839.]

To HENRY MONTAGUE GROVER, *of Boveney, in the county of Buckingham, Clerk, for his invention of improvements in brewing, by use of a material not hitherto so used.*—[Sealed March 26th, 1839.]

THIS patent is intended to protect an invention, which has for its object, a method of making a liquor or beer that will not be exciseable. For this purpose, the patentee uses the beard of barley, which, being fermented in a mash tub, as in brewing with malt, gives for its product a wort; that wort, when mixed with sugar, treacle, or saccharine matter,

is to be boiled with hops, in the usual way. By this means the patentee succeeds in making an economical beer, free of duty, and claims it as his invention.—[*Inrolled in the Petty Bag Office, September*, 1839.]

To Moses Poole, *of Lincoln's-inn, in the county of Middlesex, gentleman, for certain improvements in tanning,—being a communication from a foreigner residing abroad.*—[Sealed February 28th, 1839.]

This patent is for an improved method of applying pressure to the tanning liquid, to impregnate the skins, and consists of such an arrangement of apparatus as will allow of the tanning liquid being pressed either upwards or downwards through the skins.

There are several methods proposed for effecting this object,—the first is by means of the weight of the liquor itself, placed at a certain altitude, and being allowed to descend through a pipe, is admitted into the tanning vat, either at the top or bottom, through cocks, which open or cut off the communication, as may be required; and thus the liquid is forced either upwards or downwards.

Between each layer of skins, a layer of bark is placed, and the liquid is let on at the top and bottom of the tanning vat, alternately, until the skins are sufficiently tanned.—The necessary pressure is also obtained by a weight, spring, screw, or plunger, as may be considered convenient.

When a pressure upwards is required, then the upper cock must be closed, and the lower one opened; and if a downward pressure, then the lower cock must be closed, and the upper one opened.—[*Inrolled in the Inrolment Office, August*, 1839.]

Copyright of Designs.

The Act of Parliament, which passed in the last sessions, "*to secure to proprietors of Designs, for articles of manufacture, the Copyrights of such Designs,*" (see our Journal, Vol. XV. p. 106,) seems now to be coming into some degree of operation,—but it appears to be so little understood, that we feel ourselves imperatively called upon to notice the manner in which its powers are administered, and the absurd way that the public have in many instances misconstrued its intentions and provisions.

The Act states that "Whereas it is expedient that provision should be made for securing the exclusive benefit of designs for articles of manufacture to the authors and proprietors thereof, for a limited time; be it therefore enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same,—That every proprietor of a new and original design, made for any of the following purposes, and not published before the 1st day of July, 1839, shall have the sole right to use the same for any such purpose, during the term of twelve calendar months, to be computed from the time of the same being registered, according to this Act;" and the following are the purposes referred to:—

"First—For the pattern or print to be either worked into or worked on, or printed on or painted on, any article of manufacture, being a tissue or textile fabric, except lace, and also except linens, cottons, calicoes, muslins, and any other article within the meaning of the Acts mentioned in the schedule hereto annexed: Scecond—For the modelling, or the casting, or the embossment, or the chasing, or the engraving, or for any other kind of impression or ornament, or any article of manufacture, not being a tissue or textile fabric: Third—For the shape or configuration of any article of manufacture, except lace, and also except linens, cottons, calicoes, muslins, and any other article within the meaning of the Acts mentioned in the schedule hereto annexed."

Now the obvious meaning of this is,—that it is intended to give to the designers of any work of art (for which there existed no previous legal protection,) a copyright, for a limited time, in any novel design, device, or pattern, which they might produce.

Mechanical constructions and chemical combinations being protected by the laws of patents; and sculpture, engravings, prints, and patterns on silk, cotton, or woven fabrics, &c., by special enactments, referring to those subjects,—it has been considered necessary to define what are the especial matters intended to be embraced by this Act.

They are arranged under three heads:—First, devices worked by whatever means, say by the needle, the pencil, the loom, the stamp, &c., on any article, being a tissue or textile fabric, (except printing cotton, &c.)

Second,—devices produced upon any other substances, say metal, wood, glass, porcelain, paper, leather, &c., by means of modelling, casting, embossing, chasing, or engraving.

Third,—for the shape or conformation of any article, of whatever material made, say a vase, cup, dish, jug, tea-pot, candlestick, spoon, fork, and a thousand other things which might be enumerated; including the shapes and decorations of almost every article of furniture and domestic use—and perhaps of habiliments; observing always that it is the novel *shape* or *configuration* of the article which is the subject to be protected, and not any new mechanical construction or combination.

Taking this view, which we believe to be correct, and according both with the intention and letter of the law, we are surprised at the numerous applications which are made for the registration of matters in no way contemplated or provided for by the Act for protecting the "*Copyrights of Designs*;" and we are still more astonished at finding that those persons who have been intrusted with the discretionary power of accepting or rejecting the subjects presented for registration, should have occupied the pages of their Record with drawings of steam engines, barrel organs, weighing machines, and a variety of other kinds of mechanical

and philosophical apparatus, contrary to any intention or provision of the Act, to the manifest annoyance of tradesmen, who have the terror of legal penalties thus suspended over them;—and to the misleading of the parties who have been induced to register their inventions, and pay their monies for a presumed monopoly, which they will find to exist only in the moon.

We cannot close these remarks without noticing the character of the documents lodged in the Office of Registration.—

The design or pattern, say for paper-hangings, (which are clearly legitimate subjects for protection under this Act) are inrolled by pasting a sheet of each pattern on the leaf of a folio volume; and for every one of which a guinea is paid to the registrar; and the date of registration, with the seal of the office being put upon a duplicate sheet, that sheet is returned to the proprietor, and an exclusive copyright is thereby secured to him, for the pattern or device to continue for the term of one year.

This perhaps is the best possible mode of treating such articles as paper-hangings; but if the subject be of an embossed device or chasing, or modelling, or casting, occupying any considerable bulk,—a drawing is resorted to, which in the same way is fixed in the registration book.

It will of course be perceived that a drawing must be a very inadequate means of shewing the exact character or novelty of the design, if performed by sculpture, modelling, carving, casting, or any other mode of producing a device in relief; and as regards any peculiar character in the work, no explanation or description is given, so that the novelty of design proposed to be protected, is in general known only to the party who deposits the drawing.

The regulations of the office are these, viz:—that all subjects depicted upon paper and other substances, which are not metallic, are to have a protection or copyright for one year; but those which are to be wrought in metal, of whatever their character,—are to have protection for three years, and for which three guineas are paid.—Articles in glass, the Registrar considers are not metallic, and therefore have only the shorter term.

For inspecting the register *five shillings* is demanded for each subject, and no copies of the designs are allowed to issue from the office; and in some cases, (when the parties have requested it,) the designs are closed from the public eye.

By what means any party, (particularly if residing at a distance from London) who might be engaged in manufacturing the same sort of articles, could possibly ascertain whether the designs he was using, were like any of those registered, we are at a loss to know; and by what authority the register of a public document can be closed from public inspection, (less than by an especial Act of Parliament) is a question that perhaps the most profound lawyer could not solve.

In short, the whole affair of the Act for securing the copyrights of designs;—regulations of the office for registering them;—and of the conduct of the persons who are appointed to administer the provisions of the law, appears to be involved in such an undigested chaos of confusion, inutility, and absurdity, that probably the best mode of correcting it would be to cancel the Act, and to frame another, which should be capable, at least, of being understood; and we consider that it is quite within the reach of the legislature, and not requiring any very extraordinary expanse of genius or ability to construct such an Act as might become practically useful.

REPORT

OF THE

DIRECTORS OF THE THAMES TUNNEL COMPANY,

TO THE

General Assembly of Proprietors, held at the London Tavern, on the 3rd day of March, 1840.

GENTLEMEN,

Your Directors, in making their Annual Report, desire in the first instance, to refer to a passage in their last statement,

which held out a prospect of the near termination of the hazardous portion of this important work.

Your Directors then stated, "that they had the gratification to meet the Proprietors after many years of anxiety and delay, with the most reasonable hope of having but one more Annual Meeting between the termination of all the peculiar hazards and difficulties of the undertaking, and such an advance of the works as shall bring them near to the time when their anxious trust will be discharged by the completion of this most arduous enterprize."

Your Directors have the satisfaction now to announce the entire realization of the prospect then held out, during the past year. From the first week after the last Annual Meeting to the present time, they have had the gratification to observe a steady increase in the rate of progress. For the first fifteen weeks after that Meeting, the average weekly rate was under two feet per week, whilst, during the last few weeks the average progress has been increased to nine feet on an average weekly. With the increased rate of advance also, the average cost per foot has diminished, and has grently tended to reduce the high average cost of the work per foot, whilst the excavation was carried on under the deepest part of the River.

Your Directors, indeed, are of opinion, that could the plan of operation so elaborately detailed in two Reports, dated 18th of April and 15th of August, 1838, and which they referred to in detail in their last Report, have been adopted, both time and money would have been saved in the construction of the Tunnel, an opinion which they have before expressed, and now repeat, in order to guard against the exaggerated notions of the cost of a Roadway under a deep navigable River, compared with the ordinary mode of communication.

Their experience would now lead them to say, that whilst the steady and solid execution of this Work proves the perfect practicability of Mr. Brunel's plans for constructing Roadways under, instead of over navigable Rivers, where circumstances render it necessary, no accurate judgment can be formed of the

cost of such a Work by that of the Thames Tunnel, inasmuch as the Engineer has been constrained to follow a plan, the merit of which was solely (on the assumption of the impracticability of the work) that it risked the least portion of the public money, and for which object alone it was imposed upon the Engineer, when the money was advanced in aid of this undertaking.

The total progress during the year has been 245 feet, and the work is now within sixty feet of the Wharf Wall of Wapping.

Your Directors are now negotiating for the purchase of the property on the Wapping shore, in order to commence the footway descent,—so soon as this shall be accomplished, your Directors propose to make arrangements to open and appropriate one Archway of the Tunnel for foot passeugers, retaining the remaining one for the purpose of carrying on the Works until their final completion. They have the satisfaction to report, that according to the present plan, and provided the property could be advantageously obtained, the footway descent will be placed about fifty feet nearer the Wharf than it was originally proposed, by which arrangement, this distance of Tunnelling will be saved, as well as the earlier opening of the Tunnel obtained.

Your Directors continue to receive from the authorities of the Corporation of London, every facility they can give towards the completion of the work.

Your Directors now consider the work practically accomplished,—the local difficulties attending the construction of the Tunnel are daily yielding to the progress making; and they desire to congratulate the Proprietors, and the Public indeed, on the approaching termination of their labors, and of the great and important Work entrusted to their care.

They believe it will long endure to do honour to the science and skill of the Engineer, and the spirit and liberality of the Country. They are of opinion that the Tunnel fully deserves the description given of it by the Duke of Wellington, who, from the first to the last, has given it his countenance and sup-

port. His Grace encouraged the continuance of this undertaking at a time when it was deemed impracticable, and when necessarily his authority and the interest he took in the Work was of the highest importance. In 1828, when the Works were suspended, His Grace described it as "a Work important in a Commercial as well as a Military and Political point of view." Your Directors would add that not only do they consider this a just character of the undertaking, but that in point of economy and durability it will be found as a means of communication between the banks of the River, capable of being most favorably compared with any of the great Metropolitan Bridges.

Statements of the Receipts and Expenditure of the Company, for the year which ended on the 31st of December, 1839, with a General Balance Sheet, have been prepared, and are now submitted by the Directors for the information of the Proprietors.

B. HAWES, *Chairman.*

Thames Tunnel Office, Walbrook Buildings,
Walbrook, 3*d March,* 1840.

Electrotype.

We have, in our preceding volume, described the ingenious, and, as we considered, highly interesting invention of conducting copper, through the agency of voltaic electricity, from a solution of sulphate of copper, and depositing it upon the face of a mould in a solid form, so as to produce perfect fac-similes of medals and coins. The same process was considered to be obviously applicable to taking fac-similes of seals, stamps, and other figures, and has, we understand, been subsequently applied, with success, to those purposes; but how far the process was capable of producing copies of finely engraved copper plates, remained to be proved by careful experiment.

It is nearly forty years since the late ingenious Earl Stanhope made many efforts to produce copies of engraved plates, by means of the stereotype process, but did not ultimately succeed. The desideratum sought, viz. :—that of avoiding the enormous expense of, and time required for, engraving several copper plates of the same subject, when a large number of prints were required, has however been, in a great measure, obtained by the use of steel plates, introduced about twenty years ago by Mr. Jacob Perkins.

The process of Electrotype is now found to be fully competent to effect the object of copying and producing an unlimited number of copper plates, all possessing the identical characters and style of an original engraving, however minute and elaborately wrought.

Considering this invention to be one of very great interest, as connected with the fine arts, we have exerted our humble efforts to lay before our readers a specimen of the effect which we have been enabled to produce by means of the Electrotype process; and, as an early effort, trust that it will be received with every indulgence.

The specimen which we present to our readers, is shewn in Plate VII.—The subject is an amateur etching, from Rembrandt, and the means by which we have produced the copy, is by precipitating copper through the agency of voltaic electricity upon the surface of the plate of the original etching. By this process we obtained a type or counterpart of the plate in relief, that is, with all the lines of the original raised on the face of the new plate.

The type plate was then submitted to a similar operation, in connection with the voltaic battery; and another plate, by the precipitation of the copper, was obtained from it, in which was found sunk or engraven, (as if performed by a graver or etching point) a perfect fac-simile of the first etching.

From an inspection of the plate, it appears that the copper is in a more close and compact state than it would have been if cast from molten metal,—indeed that might be expected, from

the absence of fire in the operation; but, in this early state of the discovery, we are only able to say, that the process is capable of producing the copy shewn in Plate VII.

How the face of the copper may sustain the friction, occasioned by printing a large number of impressions, is yet to be proved; and if some of our latter prints should be found defective, (which, however, we do not expect to be the case,) it must be excused in this instance, as we have had no experience, and the plate which we are about to present, is only the second result of our efforts; this notice being written even before the plate is in a condition to be put into the hands of the printer. At a future period, we hope to be in a situation to say more upon this subject than either our experience or space will, at the present, allow us opportunity of doing.

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

Annual Report.

(Continued from page 49, Vol. XVI.)

The Council have endeavoured from time to time to direct attention to subjects on which it was conceived communications were needed or desirable, by proposing such subjects as objects for the Premiums, placed at the disposal of the Council by the munificence of the late President. The communications sent in compliance with this invitation have not been numerous. Two, however,—one by your associate Mr. Jones, on the Westminster Sewage, and the other by Mr. Hood, on Warming and Ventilating,—seemed to call for some special mark of distinction.

The communication by Mr. Jones is of the most elaborate and costly description. It consists of a large Plan of the City of Westminster, drawn to a scale of one inch to 200 feet, compiled from the originals in the possession of the Commissioners of Sewers of that district. Upon this are laid down the boundaries of the city, and parishes, and all the principal streets and squares, with the main and collateral lines of sewers, differently coloured, so as to be readily distinguished. This, with the Book of Sections, consisting of upwards of 100 sheets of tables and drawings of details of levels, lengths, and construction, furnishes an exact and authentic record of a work of great magnitude. Any extended remarks on the benefits conferred on our metropolis by the system of underground drainage, would be here surperfluous. Works of this nature are of the highest public importance, and have been repeatedly the subject of legislation by both general and local acts. The Council conceived that, in awarding to Mr. Jones a Telford Medal in Silver and Twenty Guineas for this laborious communication, they were bestowing a suitable mark of approbation on the Author of a record which is nearly unparalleled, and must be of great value as a source of information in all future works of this nature, when other, and particularly foreign, cities carry into effect a system of drainage, in which they are at present so deficient.

The Council cannot pass from this subject without expressing the obligations which the Institution is under to the Chairman and the Commissioners of the Sewers of the Westminster District. On its being intimated to them that the Council wished some account and record of the work over which they preside, permission was immediately given for any person desirous of preparing such account to have free access to all the documents in their possession relating to the subject, and to make such extracts or copies therefrom as could in any way contribute towards this object.

The communication by Mr. Hood contains a detailed account of the principles on which the salubrity of the atmosphere in

crowded rooms depends, and the various methods which have been adopted for warming and ventilation. The Author has briefly touched on the various modes of warming generally adopted, and points out the great difficulty which exists of preserving those conditions of the atmosphere which are essential to healthy respiration wherever close stoves or surfaces which may become too highly heated are employed. The importance of ventilation, and the success which has attended the adoption of mechanical means in the manufacturing districts, are subjects worthy the attention of all who study the health of those who, from choice or necessity, are exposed to the generally unwholesome atmosphere of crowded apartments. This subject is of the highest importance to the manufacturing poor of this country, who are compelled to work in crowded rooms at high temperatures. The Council are aware that much has been done towards this object in some of the large cotton works of Great Britain, and they hope ere long to obtain some detailed account of the means by which this has been accomplished, and the results which have ensued.

The Council have also awarded a Telford Medal in Silver to your Associate, Charles Wye Williams, for his communication on the Properties, Uses, and Manufacture of Turf Coke and Peat Resin Fuel; and to Mr. Edward Woods, for his communication on Locomotive Engines.

The various applications of Peat as a fuel had been repeatedly the subject of discussion at the Meetings of the Institution, and this communication may (as has been already noticed) be attributed to the discussions then going on. It is well known, that the attention of Mr. Williams, as manager of the City of Dublin Steam Packet Company, and otherwise intimately connected with steam navigation in Ireland, has been for many years directed to the application of Peat or Turf as a fuel. Public attention was more than thirty years ago directed to this subject by Mr. Griffiths, who designated the bogs of Ireland as "mines above ground." The scarcity and cost of coal, as contrasted with the abundant supply and cheapness of peat,

had long since led to the use of the latter in the steamers on the Shannon. Its bulk and tendency to absorb moisture are, however, serious impediments to its use; but these may be successfully combated by care in the preparation. Moreover, the peat, properly selected and prepared, being a carbon of great purity, is superior to every other substance for all purposes of metallurgy. But, in these researches, Mr. Williams had ulterior objects in view. He sought, by the preparation of an artificial fuel, to form a combination which should closely resemble the best kinds of natural coal, by combining with turf coke, resin, or some other bitumen of great purity, so as to produce a compound in which great heating power should exist in small bulk, and thus avoid the excess of bitumen and deficiency of carbon in the Cannel coal, as well as the deficiency of bitumen and excess of carbon in the Anthracite. It would be foreign to the object of this Report to dwell on the preparation of this fuel, or the purposes to which it is applicable; it will suffice to refer to the numerous discussions on this subject recorded in the Minutes of last Session, and to the Paper now published in the Second Part of the Third Volume of your Transactions.

The communication by Mr. Edward Woods, published in the Second Volume of the Transactions, will always bear a prominent place among the records of practical science, as one of the earliest and most accurate details on the actual working of Locomotive Engines. The first communication was received early in the Session of 1838. The Author was thought capable of adding so much to his already valuable communication, that the Council referred it back to him for this purpose, and it was not received in the form in which it appears in your Transactions till after the premiums for that Session were awarded. But this communication (notwithstanding the interval since it was laid before the Meeting) will probably be fresh in the recollection of most present, from its giving an accurate account of the progress of the Locomotive Engines on the Liverpool and Manchester Railway, from the opening of that important work. The experience of Engineers had at that time furnished them with but

little knowledge as to what were the most essential requisites in Railway Engines, and the advance of knowledge, as shewn by the history of the Locomotive Engine on this railway, is a most interesting and instructive lesson to every one who would study the progress of practical science and improvement. Great alterations were found necessary in the strength of the parts, in the weight of the engines, in the road, and the number of wheels. The first engines were gradually adapted to the necessities of the case, and the arrangements then resorted to as necessary expedients have now been adopted into the regular and uniform practice. Besides the extreme interest of that which may be termed the history of these improvements, the communication is replete with theoretical principles as to the working of Locomotives, and the advantages and disadvantages incident to peculiar practical adaptations. It would exceed the limits of this Report to do more on the present occasion than briefly to state that this paper contains extended remarks on the relative advantages of four or six wheels, of inside or outside framings, of crank axles or outside crank pins, of coupled or uncoupled engines. The Council would point out this paper to the junior members of the profession, as an example of how great a service may be rendered by simply recording what passes under their daily observation and experience.

The Council have also adjudged a Telford Medal in Bronze and Books to the value of Three Guineas to Mr. R. W. Mylne, for his communication on the Well sunk at the reservoir of the New River Company at the Hampstead Road; to Lieutenant Pollock, for his drawings and description of the Coffre Dam at Westminster Bridge; and to Mr. Redman, for his drawings and account of Bow Bridge.

The communication by Mr. Mylne contains an account of the various attempts which have been made in the metropolis and its environs to obtain water from the sand strata, by means of wells and small bores, in which the water rises naturally to the surface. These attempts, and the raising the water by artificial means from the sand strata, have been for the most part unsuccessful. In

some cases, parties having communication with the same sand stratum and contiguous to each other, were unable to obtain water at the same time, as the drawing water by one had the effect of destroying the supply of all the others. In other cases, the sand coming away with the water, large cavities were formed of such a uature as, after a short time, entirely to suspend the progress of the works. Of the latter difficulty, some remarkable instances occurred during the sinking of the well in the Hampstead Road, which are particularly described in the communication. The supply of water from the sand being, from the causes just alluded to, very precarious, the New River Company, in March, 1835, determined on sinking a well through the clay and sand into the chalk, for the purpose of ascertaining the supply of water from this source. The peculiar difficulties experienced in the progress of this work, and the means by which these and similar difficulties are to be overcome, as set forth in the report of Mr. Simpson, appended to the communication, furnish a valuable compendium of information on this subject; and, being replete with practical details of an executed work of no ordinary difficulty, is one of those communications to which the Council are most anxious to give every encouragement in their power.

Thn communication by Lieutenant Pollock on the Coffre Dam now fixed round the 18 and 14-feet piers of Westminster Bridge, and by Mr. Redman on the New Stone Bridge over the River Lea at Stratford-le-Bow, are of a similar character with the preceding; they are both accurate accounts, accompanied by valuable drawings, of important works actually executed. The collection of such records ought ever to be a primary object with the Institution, and their authors are most justly deserving of such marks of distinction as it is in the power of the Institution to bestow. The Council would point out the above as instances of the facility with which individuals may contribute to their own advancement and reputation, no less than to the objects which the Institution has in view; and would more particularly advert to Lieutenant Pollock, who, while in England, on leave of absence

from India, occupied himself in acquiring engineering knowledge, and, with most praiseworthy diligence, availed himself of the opportunities afforded him of observing and recording the progress of the works at Westminster Bridge. Works of this nature are accessible to most of those who are studying for the profession, and by making use of the opportunities which are afforded them, they will be able to prepare communications most deserving of such distinctions as those which have just been conferred.

Among the other communications of the Session, the Council cannot, on the present occasion, omit to notice those of your Member, Mr. Parkes. His communication on the Evaporation of Water from Steam Boilers, for which a Telford Medal in Silver was awarded during the preceding Session, and the interesting discussions to which it gave rise, are too well known to require further comment. But, great as were the benefits conferred on practical science by the facts there recorded, they have been much surpassed by the subsequent labours of this author. In continuation of his subject, you received early in the Session the first part of a communication on Steam Boilers; and at the close of the Session, the second part, treating of Steam Engines. Before Mr. Parkes was induced to turn his attention to the preparation of these communications, no attempt had been made to bring together, in one connected view, the various facts which had been ascertained. The economy of the Cornish system was indisputable; but to what it was to be referred was involved in some obscurity. It was reserved for this communication to call attention to certain quantities and relations which exerted a peculiar influence over the results; and which, being rightly ascertained, were at once indicative or exponential of the character of the boiler. If it be found that, in one class of boiler, the same quantity of coal is burnt eight times as rapidly as in another class—that the quantity consumed on each square foot of one grate is twenty-seven times that on the grate of another—that the quantity of water evaporated bears some definite relation to the quantity of heated surface—and that there

is twelve times more evaporated by each foot of heated surface in one class of boiler than in another—and finally, that the quantity of water evaporated by a given weight of fuel is in one class double the quantity evaporated in another,—we have arrived at some definite relations whereby to compare boilers of different kinds with each other. To these definite quantities and relations, the author, with apparent propriety, assigns the terms "exponents;" and these being compared together for different boilers, their respective merits as evaporative vessels are readily perceived. Mr. Parkes has also called the attention of engineers to the effect of the element time, that is, the period of the detention of the heat about the boiler. The importance of attending to this cannot be too strongly insisted on; as it would appear from these statements, that boilers being compared with each other, in respect of their evaporative economy, are nearly inversely as the rate of combustion. Attention is also called to the fact, that there are actions tending to the destruction of the boiler, entirely independent of the temperature of the fire, and which may be designated by the term "intensity of calorific action." Of their nature we know nothing, but the durability of different boilers, under different systems of practice, affords some means of comparing the intensity of these actions.

Mr. Parkes having, in the first part of the subject, thus pointed out the distinctive features of the different classes of boilers as evaporative vessels, proceeds, in his subsequent and concluding communication, to consider the distribution and practical application of the steam in different classes of steam engines. And for this purpose, he is led to consider the best practical measure of the dynamic efficiency of steam—the methods employed to determine the power of engines—the measures of effect—the expenditure of power—the proportions of boilers to engines—the standard measure of duty—the constituent heat of steam—the locomotive engine—the blast and resistance occasioned by it—the momentum of the engine and train, as exhibiting the whole mechanical effort exerted by the steam—the relative expenditure of power for a given effect, by fixed and locomotive non-con-

densing engines. This bare enumeration of the principal matters in the second communication, will give some, though a very inadequate, idea of the magnitude of the task undertaken by Mr. Parkes, for the communication is accompanied by elaborate and extensive tables, exhibiting the results of the facts which he has collected and used in the course of his enquiry, and it may confidently be asserted, that a more laborious task has rarely been undertaken or accomplished by any one individual than the series of communications thus brought before the Institution.

It will be one of the earliest duties of the succeeding Council, to consider in what manner the sense of the great benefits conferred to this department of practical science, can most appropriately be testified.

The Council also received, at the close of last Session, from your Member, Mr. Leslie, a most valuable communication on the Docks and Harbour of Dundee. This is one of the records on which the Institution sets the highest value, being the detailed account of an executed work of great extent. It is not, in its present form, well adapted for being laid before the Meetings; but on its publication, which will take place very shortly, the Institution will have an opportunity of judging of the high value which it possesses.

In acknowledging, with gratitude, the numerous and valuable Presents made to the Institution during the past year, the Council would call the attention of the Members generally to the want still existing in the Library of works of reference on general scientific subjects not immediately connected with engineering, and express a hope that such wants may be supplied by that liberality to which the Institution is already so deeply indebted. The Collection of Models also requires many additions to render it as complete as the Council could wish; and it is only by the wants of the Institution being constantly borne in mind by all who are interested in the subject, that such a collection can be formed as shall be worthy of the Society.

Several societies have made an exchange of Transactions with the Institution, and from the Royal Society of Edinburgh, the Philosophical Society of Manchester, the Royal Irish Society,

and the Astronomical Society, sets of Transactions, as complete as could be made up, have been received. The Master-General of the Ordnance, the Lord-Lieutenant of Ireland, and Colonel Colby, continue their liberal presents of the English and Irish Surveys; and Captain Beaufort and the Secretary of the Admiralty have continued the present of the series of Admiralty Charts. The Institution is also indebted to Mr. Vignolles for the Busts of Locke and Dr. Hutton; to Mr. Field, V.P., for a Bust of the late Henry Maudslay; and to Mr. Rivers, for that of Dr. Faraday.

The Council would wish to take especial notice of the large collection of works of the late eminent philosopher, Dr. Young, now deposited in your Library. For this great acquisition, the Institution is indebted to the kindness and liberality of his brother, Mr. Robert Young, who conceiving most justly that every thing connected with so great a benefactor to practical science must be highly valued by this Institution, has made it the depository of these books from the library of his distinguished relative. The Council, in thus publicly recording their sense of the kindness and liberality of Mr. Robert Young, would earnestly press upon others the importance of following so noble an example, and of presenting such works as are at their disposal, and of which the Library of the Institution is particularly in need.

It was announced, through the medium of the last Annual Report, that the monument of Telford was nearly finished, and that a site had been selected in Westminster Abbey. The Council have now the satisfaction of announcing, that the monument is fixed in the place destined for it, and they are confident that all who enjoyed the acquaintance, or knew the merits of the late distinguished President of this Institution, will rejoice that the memory of one so eminent and so highly deserving has met with so proper and just a tribute of respect; whilst all, no less than those by whose liberality the monument was erected, will feel that he has a name which will endure so long as there exists a record of the triumphs of the British Engineer.

[*To be continued.*]

New Patents

SEALED IN ENGLAND.

1840.

To James Beaumont Neilson, of Glasgow, gentleman, for certain improved methods of coating iron, under various circumstances, to prevent oxidation or corrosion, and for other purposes.—Sealed 29th February—6 months for inrolment.

Rowland Macdonald Stephenson, of Upper Thames-street, London, engineer, for an improved method or methods of adjusting, shifting, and working theatrical scenery and apparatus.—Sealed 29th February—6 months for inrolment.

Richard Edwards, of Fairfield-place, Bow, dealer in emery cloth, for improvements in preparing and combining of materials used in lighting or kindling fires.—Sealed 29th February—6 months for inrolment.

John Sylvester, of Great Russell-street, engineer, for improvements in the construction of doors and frames for closing the openings of fire-places, ash-pits, flues, chimnies, and certain retorts.—Sealed 3rd March—6 month for inrolment.

Joseph Shore, of Birmingham, merchant, for improvements in preserving and covering certain metals and alloys of metals.—Sealed 3rd March—6 months for inrolment.

James Horne, of Clapham Common, Esq., for improvements in the stuffing boxes of lift pumps.—Sealed 3rd March—6 months for inrolment.

Joseph Clisild Daniell, of Limpley Stoke, Wilts, for an improved method of preparing shoot or weft, to be used in weaving woollen cloth, and cloths made of wool and other materials.—Sealed 3rd March—6 month for inrolment.

John Rangeley, of Camberwell, gentleman, for improvements in the construction of railways, and in the means of applying power to propelling carriages and machinery.—Sealed 3rd March—6 months for inrolment.

William Craig, of Glasgow, engineer, and William Douglas Sharp, of Stanley, Perthshire, for certain improvements in machinery for preparing, spinning, and doubling cotton, flax, wool, and other fibrous subtances.—Sealed 3rd March—6 months for inrolment.

Joseph Norton, of High Bridge Mill, York, and George Collier, of Kelmanthorpe, in the same county, mechanic, for an improvement in looms for the weaving of figured and twilled fabrics.—Sealed 4th March—6 months for inrolment.

Joseph Bower, of Hunslet, York, soda ash manufacturer, for certain improvements in the manufacture of carbonate of soda.—Sealed 4th March—6 months for inrolment.

Charles Alexander Pellerin, of Leicester-square, gentleman, for improvements in wind and stringed musical instruments,—being a communication.—Sealed 4th March—6 months for inrolment.

Charles Kober, of Leadenhall-street, London, cloth manufacturer, for improvements in fixing colour in cloth.—Sealed 7th March—6 months for inrolment.

Caroline Julia Sophia Cox, of Addison-road, Kensington, spinster, for an improved mode of fastening and uniting the edges of the divided parts of shoes, boots, bandages, packages, and other articles of dress or utility.—Sealed 7th March—2 months for inrolment.

Joseph Atkinson, of Round Hill, near Masham, York, farmer, for improvements in thrashing and winnowing machines.—Sealed 7th March—6 months for inrolment.

Robert Molyneux, of Southampton-row, Middlesex, chronometer-maker, for an improvement or improvements in chronometers.—Sealed 7th March—6 months for inrolment.

William Maltby, junior, of Mile End, chemist, and Richard Cuerton, junior, of Percy-street, brass-founder, for improvements in extracting and concentrating the colour, tanning, and other matter contained in vegetable and animal substances.—Sealed 7th March—6 months for inrolment.

Luke Hebert, of Birmingham, civil engineer, for improvements in the manufacture of cofered spades and shovels, soughing and grafting tools, and other implements of a like nature,—being a communication.—Sealed 7th March—6 months for inrolment.

Hayward Tyler, of Milton-street, Cripplegate, engineer, for certain improvements in machinery or apparatus for impregnating liquids with gas, including bottles for retaining, keeping, and preserving liquids so impregnated; also in the manner of filling and closing such bottles.—Sealed 7th March—6 months for inrolment.

James Knowles, of Little Bolton, Lancaster, coal merchant, for an improved arrangement of apparatus for regulating the supply of water to steam boilers.—Sealed 10th March—4 months for inrolment.

George Gwynne, of Portland-terrace, Regent's Park, gentleman, for improvements in the manufacture of candles, and in operating upon oils and fats.—Sealed 10th March—6 months for inrolment.

William Forrester, residing at Barrhead, Renfrew, manager, for certain improvements in sizing, starching, dressing, and otherwise preparing warps for weaving fabrics, and on the machinery and apparatus therewith connected.—Sealed 11th March—6 months for inrolment.

Thomas Peet, of Bread-street, Cheapside, gentleman, for certain improvements in steam engines,—being a communication.—Sealed 11th March—6 months for inrolment.

Richard Smith and Richard Hacking, both of Bury, Lancaster, machine-maker, for certain improvements in machinery or apparatus for drawing, slubbing, roving, and spinning cotton, wool, flax, silk, and other fibrous substances.—Sealed 13th March—6 months for inrolment.

Etienne Robert Gaubert, of Paris, professor of mathematics, for certain improvements in machinery or apparatus for distributing types or other typographical characters into proper receptacles, and placing the same in order for setting up, after being used in printing. –Sealed 13th March —6 months for inrolment.

James Hadden Young, of Lille, kingdom of France, merchant, and Adrien Delcambre, of Lille aforesaid, manufacturer, for an improved mode of setting up printing types.—Sealed 13th March—6 months for inrolment.

Robert Varicas, of Burton-crescent, surgeon, for improvements in rendering fabrics and leather waterproof.—Sealed 16th March—6 months for inrolment.

William Crofts, of Radford, Nottingham, machine-maker, for improvements in machinery for the purpose of making figured or ornamented bobbin net, or twist lace, and other ornamented fabrics, looped or woven.—Sealed 16th March —6 months for inrolment.

Jean François Victor Fabien, of King William street, London, for improvements in rotary engines, to be worked by steam or other fluids.—Sealed 16th March—6 months for inrolment.

Thomas Craddock, of Broadheath, Radnor, farmer, for a certain improvement or improvements in steam engines and steam boilers.—Sealed 16th March—6 months for inrolment.

Richard Smith and Richard Hacking, of Bury, Lancaster, machine-makers, for certain improvements in machinery for spinning cotton and other fibrous substances.—Sealed 16th March—6 months for inrolment.

Isham Baggs, of Cheltenham, gentleman, for improvements in engraving, which improvements are applicable to lithography.—Sealed 17th March—6 months for inrolment.

Moses Poole, of Lincoln's-inn, gentleman, for improvements in producing and preparing leys for soap making, and in the manufacture of soap,—being a communication.—Sealed 17th March—6 months for inrolment,

Samuel Seaward, of the canal iron works, Poplar, engineeer, for certain improvements in the construction of steam engines, and in the application of steam engines to propelling ships and other vessels.—Sealed 17th March—6 months for inrolment.

Sir William Burnett, of Somerset House, Knight, Commander of the Royal Hanoverian Guelphic Order, for improvements in preserving animal, woollen, and other fibrous substances from decay.—Sealed 19th March—6 months for inrolment.

John Jackson, of Manchester, nail and bolt manufacturer, for certain improvements in the manufacture of nails, nuts, bolts, and rivets.—Sealed 19th March—6 months for inrolment.

Thomas Stirling, of Limehouse, patentee of the "Rapid Filterer," for improvements in the maufacture of fuel.—Sealed 20th March—6 months for inrolment.

Francis William Gerish, of East-road, City-road, patent hinge-maker, for improvements in locks and keys, and in other fastenings for doors, drawers, and other such purposes.—Sealed 20th March—6 months for inrolment.

Charles Keene, of Sussex-place, Regent's Park, gentleman, for improvements in producing surfaces on leather and fabrics,—being a communication.—Sealed 23rd March—6 months for inrolment.

William Newton, of the Office for Patents, Chancery-lane, civil engineer, for certain improvements in the strengthening and preserving of ligneous and textile substances,—being a communication.—Sealed 23rd March—6 months for inrolment.

Samuel Hill, of Sloane-street, Chelsea, gentleman, for improvements in the making of bread and biscuits.—Sealed 25th March—6 months for inrolment.

Elhanan Bicknell, of Newington Butts, merchant, for improvements in separating the solid from the liquid parts of tallow and other fatty matters,—being a communication. —Sealed 25th March—6 months for inrolment.

William Palmer, of Sutton-street, Clerkenwell, candle-maker, for improvements in the manufacture of candles, and in apparatus for applying light.—Sealed 25th March—6 months for inrolment.

Henry Smith, of Birmingham, lamp manufacturer, for improvements in gas burners and in lamps.—Sealed 25th March—6 months for inrolment.

George Richards Elkington, and Henry Elkington, of Birmingham, for improvements in coating, covering, or plating certain metals.—Sealed 25th March—6 months for inrolment.

Joseph Crosfield, of Warrington, soap-maker, for certain improvements in the manufacture of plate glass.—Sealed 25th March—6 months for inrolment.

Samuel Knight, of Woodhouse Mills, Lancaster, bleacher, for certain improvements in machinery or apparatus for boiling, bucking, or scouring, for the purpose of preparing and assisting the process of bleaching, and dyeing cotton linen, and other fabrics and fibrous substances.—Sealed 25th March—6 months for inrolment.

James Hay, of Belton, Scotland, captain in the Royal Navy, for an improved plough, which he entitles "The Belton Plough."—Sealed 25th March—6 months for inrolment.

Henry Philip Roquette, of Norfolk-street, Strand, merchant, for a new pigment,—being a communication.—Sealed 25th March—4 months for inrolment.

James Sabberton, of Great Pulteney-street, Golden-square, tailor, for a fastening to attach straps to the bottoms of trousers.—Sealed 26th March—2 months for inrolment.

Alexander Southwood Stocker, of Birmingham, manufacturer, for certain improvements in manufacturing tubing or tubes, which are applicable to gas and other purposes. —Sealed 27th March—6 months for inrolment.

Richard Prosser, of Cherry-street, Birmingham, civil engineer, for certain improvements in machinery or apparatus for manufacturing pipes.—Sealed 27th March—6 months for inrolment.

Henry Kirk, of Upper Norton-street, Portland-place, merchant, for improvements in the application of a substance or composition, as a substitute for ice for skating and sliding purposes; part of which improvements may also be employed in the manufacture of ornamental slabs and mouldings.—Sealed 28th March—6 months for inrolment.

John Bethell, of St. John's Hill, Wandsworth, gentleman, for improvements in treating and preparing certain oils and fatty matters.—Sealed 28th March—6 months for nrolment.

CELESTIAL PHENOMENA, for April, 1840.

D.	H.	M.	
1			Clock before the sun, 3m. 53s.
	—		☽ rises 5h. 3m. M.
	—		☽ passes mer. 11h. 3m. M.
	—		☽ sets 5h. 21m. A.
	21	49	☿ in conj. with ♂ diff of dec. 3. 56. N.
2	3	21	Ecliptic conj. or ● new moon
2	17	27	☿ in conj. with the ☽ diff of dec. 0. 36. S.
	19	10	♂ in conj. with the ☽ diff. of dec. 4. 30. S.
3	16	14	♃'s third satt. will im.
4	2		☽ in Perigee
5			Clock before the sun, 2m. 42s.
	—		☽ rises 6h. 11m. M.
	—		☽ passes mer. 2h. 37m. A.
	—		☽ sets 11h. 22m. A.
	14	24	♃'s first satt. will im.
	19	5	♀ in conj. with Her: diff. of dec. 0. 40. N
7	4	48	Vesta stationary.
	10	15	☿ in Inf. conj. with the sun
	15	8	♀ in Aphelion.
8			Occul α Gemi im. 13h. 46m. em. 14h. 33m.
9	6	22	☽ in □ or first quarter.
10			Clock before the sun, 1m. 17s.
	—		☽ rises 11h. 27m. M.
	—		☽ passes mer. 7h. 38m. A.
	—		☽ sets 3h. 7m. M.
	4		Pallas in □ with the sun
11			Occul γ in Leonis im. 10h. 7m. em. 10h. 24m.
14	10	46	♃'s first satt. will im.
15			Clock after the sun, 0m. 2s.
	—		☽ rises 5h. 54m. A.
	—		☽ passes mer. 11h. 18m. A.
	—		☽ sets 4h. 10m. M.
16	7	55	Ecliptic oppo. or ○ full moon
	10	44	☿ in the descending node.
			Occul 85 Virginis im. 8h. 3m. em 9h. 10m.
17	8	41	Ceres in □ with the ☉
18			Mercury R. A. 0h. 44m. dec. 4. 19. N.
	—		Venus R. A. 0h. 12m. dec. 0. 22. S
	—		Mars R.A. 2h. 1m. dec. 12. 2. N.
	—		Vesta R. A. 16h. 14m. dec. 11. 4. S.
	—		Juno R. A. 4h. 47m. dec. 12. 26. N.

D.	H.	M.	
	—		Pallas R. A. 19h. 11m. dec. 15. 33. N.
	—		Ceres R. A. 20h. 3m. dec. 23. 51. S.
	—		Jupiter R. A. 14h. 53m. dec. 15. 20. S.
	—		Saturn R. A. 17h. 23m. dec. 21. 39. S.
	—		Georg. R. A. 23h. 19m. dec. 5. 10. S.
	—		Mercury passes mer. 22h. 54m.
	—		Venus passes mer. 22h. 26m.
	—		Mars passes mer. 0h. 14m.
	—		Jupiter passes mer. 13h. 6m.
	—		Saturn passes mer. 15h. 34m.
	1	21	♃ in conj. with the ☽ diff. of dec. 6. 27. N.
19	19	18	☿ stationary
	22		☽ in Apogee.
20	22	2	♄ in conj. with the ☽ diff. of dec. 6. 25. N.
			Clock after the sun, 1m. 22s.
	—		☽ rises 11h. 53m. A.
	—		☽ passes mer. 2h. 20m. M.
	—		☽ sets 5h. 47m. M.
21	12	40	♃'s first satt. will im.
24	11	47	☽ in □ or last quarter
	11	54	♃'s second satt. will im.
25			Clock after the sun, 2m. 11s.
	—		☽ rises 2h. 23m. M.
	—		☽ passes mer. 6h. 32m. M.
	—		☽ sets 10h. 51m. M.
26	10	40	☿ in conj. with ♀ diff. of dec. 0. 39. S.
	—		Occul σ Aquarii im. 16h. 21m. em 17h. 14m.
	14	8	☿ in Aphelion
27	23	3	Her: in conj. with the ☽ diff of dec. 2. 18. S.
28	14	34	♃'s first satt. will im.
29	20	41	☿ in conj. with the ☽ diff. of dec. 6. 36. S.
30			Clock after the sun, 2m. 57s.
	—		☽ rises 3m. 34s. M.
	—		☽ passes mer. 10m. 28s. M.
	—		☽ sets 5m. 43s. A.
	0	33	♀ in conj. with the ☽ diff. of dec. 5. 37. S.
	8	26	♀ greatest Hel. Lat. S.
	9	2	♃'s first satt. will im.

J. LEWTHWAITE, Rotherhithe.

THE

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CONJOINED SERIES.

No. C.

Recent Patents.

To John Wright, *of Park-place, near Glasgow, gentleman, for certain improvements in mixing or alloying iron with other metals, for the purpose of increasing its strength, tenacity, or cohesion; which alloys, among many other uses, are particularly applicable to the construction or manufacture of links for chains and rings; and certain machinery for effecting such manufacture.*—[Sealed 18th June, 1839.]

These improvements in mixing iron with other metals for the purpose of increasing its strength, which, among many other uses, are particularly applicable to the construction or manufacture of links for chains and rings, and in certain machinery for effecting such manufacture, consist, firstly, in mixing or combining bundles or coils of rods, wires, or strips of iron with copper (or other pure metal not easily

fusible) in a molten state, in order that such molten metal may enter into the interstices or spaces between the rods, wires, or strips of iron, so combined in bundles or coils, and by uniting with the iron form together a solid compact mass of the two metals, which will possess considerably greater strength or tenacity than either of the metals would possess if employed alone in similar quantities or weight. Secondly,—such combined metals will, from their increased strength or tenacity, be applicable to the formation of a great variety of articles; such, for instance, as bars and rods for pistons, for bolts, and for shafts for axles, and the framing of various kinds of erections, as rafters, and for bridges, and viaducts, and rails generally, and many other things which it is unnecessary to enumerate; also for hollow cylinders and tubes, as the cylinders of steam-engines, or barrels of guns, and certain kinds of vessels, for boxes of wheels, for pipes, and many other uses; likewise for the manufacture of the links of chains and rings for various purposes. Thirdly,—in a peculiar construction of machinery, by which wires may be wound into successive hanks or rings, in which operation of winding, the links are connected one to another.

As respects the first head of this invention, I combine, either longitudinally or in helical coils, any desirable number of wires, rods, or strips of iron, of suitable dimensions, in what would be called bundles, faggots, piles, or coils, by winding, placing, or piling such wires, rods, or strips of iron, within or upon a mould formed to the figure of the intended article; and if a tube, then the surface of the mould must be first covered with a plate of sheet iron; and then, by means of other wires as strings, bind round such bundles, so as to confine the wires, rods, or strips of iron, securely in the positions in which they have been wound, placed, or piled. The iron wires, rods, or strips,

being thus secured by the binding wires or strings, the muld, if any, within or upon which they have been wound, placed, or piled, must then be withdrawn, which may be readily done if the mould is constructed so that its parts will take asunder.

The bundles, piles, or coils of iron, having been so arranged according to the shape of the article to be made, I melt a quantity of copper, (say the red copper of commerce,) and when such copper has been perfectly melted, skim its surface; I then introduce into the molten copper such a quantity of pulverized glass as will be sufficient to agglutinate the remainder of the scoria, and then carefully remove all the scoria which remains. A small quantity of borax is then introduced as a flux, and after that has been done, immerse the articles formed of the coiled, piled, or faggoted iron, into the molten copper for a space of time, sufficient for the melted metal to insinuate itself into all the interstices or spaces between the several pieces of iron. The necessary time for immersion will depend upon the thickness or substance of the bundle, pile, or hank of the iron bound together.—For a small substance, half a minute would be sufficient for immersion; for a larger bulk, a minute, or a minute and a half; and this may be extended up to five or six minutes, which might be necessary for articles of large bulk. The object to be obtained being, that when the article is withdrawn from the molten metal it may have united with the iron, and the whole be formed into a solid and compact mass of the two metals. Many of the articles of small dimensions may be plunged into the melted metal and quickly withdrawn; but some, such as lengths of chains, it may be found desirable to pass slowly through the melted metal, observing, the time necessary for immersion is only such as will allow the melted

metal to flow perfectly through, and attach itself to the iron in a compact mass.

When the articles so formed of the two combined metals have become cold, they will be found to possess the very great increased strength above stated; and may, if required, be turned and polished on the surface, as would be necessary in the case of axles, piston rods, and many other articles; also for tubes, as gun barrels, and boxes for wheels, and many other things; but chains, bars, and other articles, need not be polished, but will be fit for use as soon as they have been withdrawn from the melted metal, cooled, and the binding wires removed.

The third head of the invention, consisting of the machinery for winding wires into the forms of links or rings, is exhibited in the accompanying drawing, (see Plate VI.,*) in which fig. 1, is a bird's-eye view of the machine.

Fig. 2, is a plan view of the under part of the machine, which figures represent the machine complete.

The following figures shew parts of the machine detached. In order that the construction and operation of the machine may be perfectly understood, I will, before going into the details, state the objects to be effected.

In this machine, a length of iron wire is drawn from a reel below, and being conducted upwards, is then passed through a guide on to a pulley, to which the end of the wire is made fast. This pulley is then made to revolve, and in so doing, causes the wire to be tightly wound round its periphery. The wire is, by means of the guide, laid evenly upon the pulley, and when a sufficient quantity of wire has been so wound, it is confined in its coil by binding wire passed round it, in several places, to keep the wire altogether in close contact; the pulley is then removed from the machine, and, on its parts being separated, the

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* This Plate was published in our last Number.

hank of wire comes off in the form of a ring or link. This coiled ring or link of wire is then put through the opening in the pulley, (as will be further explained,) and is confined or linked to the pulley. The pulley is then put into the machine again, and another hank of wire wound round the pulley, which being completed as before, the pulley is then removed, and its parts being separated, the two coils or rings of wire will be found to be linked one to the other.

Fig. 5, represents the frame detached, shewn at A, in fig. 3. This frame, when fastened to the wooden table, carries the hollow stud E, on which the winding pulley B, is to revolve;—this pulley is shewn detached in several positions, at fig. 10. The said frame also carries the axle or shaft D, on which a toothed wheel C, is fixed, as shewn at figs. 1, 3, and 4. It will be seen that the inner edge of the pulley B, has a rim of teeth, into which the teeth of the wheel C, are made to gear; hence it will be perceived, that when the winch and axle D, revolve, the wheel C, will give rotary motion to the pulley B, and thereby cause the wire, drawn off the reel X, and passed through the guide, to be wound round in the groove of the pulley, and thereby formed into the hank, ring, or link, before described.

Fig. 11, shews the stud on which the winding pulley revolves, in several positions.

Fig. 12, represents another winding pulley, in different positions;—this pulley having a circular form, whereas the former, at fig. 10, was an oval pulley, both having the circle of teeth on their edge, by which they are driven round by the rotary toothed wheel C. It will be seen that both these pullies separate in the middle of the groove, and also that they open upon a joint, the first of which is for the purpose of slipping the hank of wire off the pulley after the wire has been wound into the form of the link or ring;

the opening upon a joint is for the purpose of admitting one side of the link into the interior of the pulley, when a second hank of wire is to be wound and linked on to the former.

I have hitherto been considering the mode of making round chains, as those used for cables; in which case, I should guide the wire as it winds upon the pulley by means of a hand apparatus, shewn in different positions at fig. 8 and 9, and in operation at G, and H, fig. 4.

I will, however, now describe the mode of making flat chains, such as are employed for deep pits.—In this case, the groove of the pulley must be made square, as at fig. 13, and instead of guiding the wire by hand, I employ a sliding guide and rod, shewn detached at fig. 7, and in operation at fig. 3. This rod J, moves in eyes on the upper edge of a vertical board H; the guide I, is fixed upon it, through which the wire passes. At the end of the rod a small anti-friction roller is mounted, bearing against the irregular edge of a circular cam F, shewn in several positions at fig. 6. Against this cam the end of the guide rod is pressed by a worm-spring.—This cam is formed on the face of a ratchet wheel K, fig. 6, and shewn in operation, turning upon a stud, fixed in the frame A, in figs. 3 and 4. On the shaft D, there is a small detant L, which, as the shaft revolves, at every half rotation, moves the ratchet wheel one tooth, and by that means brings the different elevations of the cam against the end of the sliding rod, and thereby causes the guide to traverse the wire to and fro, from side to side of the groove in the winding pulley, and consequently causing it to wind evenly in helical coils. The numbers on the face of the ratchet wheel shew the number of the rotations of the winding pulley, the index M, being stationary.

Fig. 14, represents the jointed arm O, which keeps the

stud and the winding pulley in its place, as at figs. 1 and 3. In the event of one of the links of a chain breaking, I open the pulley, and put the two unconnected links into the interior of the pulley, as at fig. 15; and to admit of one of the links lying sideways, a notch or opening is made in the stud, as at fig. 11, which admits of the chain being placed in the position seen in fig. 3; when the pulley being made to revolve as before, a link or ring is wound round the two separated links, and they are linked together in the same way that the links were formerly made, one through the other.

In order to form long links for the construction of chain bridges and other purposes, I employ, instead of the former winding pulley, the circular plate, shewn at fig. 16, in which I fix two small pullies, at such distances apart as the desired length of the link;—these are intended to form eyes of the links. This plate I mount upon the axle D, in place of the wheel C, and drawing the wire off the reel X, as the plate revolves, wind the wire into the looped form represented at fig. 17; and having placed eyes at the ends, press the sides by bandages of wire into the form shewn at fig. 18.

The application of these formed links, and the mode of connecting them, is shewn in several auxiliary figures, 19, 20, and 21, the latter of which has additional pieces of wire placed round the eyes to give greater strength to those parts. The whole of the wires are then connected together, as described above.

Fig. 22, represents an axle for a carriage, formed, as before described, by a bundle of rods, and turned in a lathe to the proper figure.

I have only to add, that there are many pieces shewn under each figure, and that in those cases they represent

the parts thereto belonging, drawn in different positions, merely for the purpose of more perfectly describing their forms.—[*Inrolled in the Rolls Chapel Office, December,* 1839.]

Specification drawn by Messrs. Newton and Berry.

To MILES BERRY, *of the Office for Patents,* 66, *Chancery-lane, in the county of Middlesex, civil engineer, for certain improvements in the construction of weighing machines,—being a communication from a foreigner, residing abroad.*—[Sealed 5th October, 1833.]

THE invention communicated to the patentee is described in the following words:—" These improvements in the construction of weighing machines apply to that particular kind of apparatus called platform weighing machines, and which may be employed for weighing either light or heavy goods. They may be either erected as stationary engines for weighing goods in warehouses, or loaded carriages passing along a road, or they may be made portable for ordinary, commercial, or domestic use.

The improvements consist in a new arrangement of compound levers, and of the positions of the fulcrums or pivots on which they vibrate, with suitable graduations upon the index beam, and a simple mode of adjusting the apparatus or compensating for any expansion or contraction of the levers from any variations of temperature.

In the accompanying drawings, (see Plate VIII.,) fig. 1, represents a plan or horizontal view of one of these improved machines intended to be fixed on the floor of a warehouse or in a road-way. Fig. 2, is a corresponding plan or horizontal representation, in which the platform is

removed for the purpose of exposing the levers and other internal parts to view. Fig. 3, is a side elevation of the machine complete, similar letters referring to the same parts in all the figures. A, A, is the external frame-work made of timber or other suitable material; B, B, are two sills or beams extending lengthways of the machine, sustaining the frame-work to which they are attached; C, C, are two transverse bars of wood which are called rockers,—the levers D, D, being firmly attached thereto.

These rockers bear and vibrate upon four knife-edges on the tops of the standards E, E, which are supported by the sills B, B, one of these standards being represented in perspective at fig. 4. A recess is formed in the top of each standard, which may be made of hardened steel, cast iron, or other metal, to prevent its wearing away; E, E, are the bearing arms affixed to the rockers by which they vibrate upon the standards. One of these is also seen in the detached fig. 4, with its knife-edge bearing upon the standard E.

The projecting bars G, on the upper side of each of the arms F, also form a knife-edge support or fulcrum, upon which the pieces of steel H, at the under side of the platform are supported. The parts I, I, (see fig. 5,) are excavations made in the under side of the platform timbers to enable it to play free from the end of the arm F, which rises immediately above the standards; J, J, are braces extending from the rockers to the levers to keep them in their proper positions.

The pivots or fulcrums, made in this way, are considered not only to be superior in strength compared with those usually employed, but their points of bearing, from the manner in which they are connected, will always remain at the same distance from each other, and the cord will also

preserve the same relation to the power, the bearing edges uniformly preserving their horizontal range.

The middle fulcrum or pivot of suspension seen at *k*, will be best explained by reference to the detached fig. 6, The part *a*, is made fast to the lower side of the lever D, and the part *b*, to the upper part of the lever D*, the double or connecting hook *c*, embracing the knife-edges on both *a*, and *b*.

Fig. 7, is a perspective view of the upper part of the knife-edges, or the one fixed on to the lever D*, and which is seen in section at fig. 6. The end of the lever D*, extends under the edges of one side of the frame where it is connected with the balance or steelyards hereinafter described. In the elevation, fig. 3, the lever D*, is seen connected to the rod L, the lower end of which, in the form of a hook, passes under a knife-edge at the end of the lever; the hook is seen in the detached fig. 8, and the staple on the end of the lever, of which the knife-edge forms a part, is shewn at fig. 9, but in a reverse position,—it is shewn in its right position in fig. 10. This staple is fastened on the under side of the lever D*, by the screw and nut *n*, which admits of its being adjusted to its place with precision.

In order to prevent the thrust or swing of the platform to which it may be subjected by drawing a load on to it, or by shifting it when placed thereon, jointed rods, chains, or links, are attached to the end pieces of the frame-work, which rods have hooks or loops upon their ends adapted to pass into staples or to pieces affixed for that purpose on the under side of the platform;—four should be employed, and when hooked or looped they should have a slight play so as not to bind the platform, but allow it to descend the small distance required in weighing; at the same time they must prevent its sticking or rubbing against the frame.

By placing these rods alongside of the timbers or bearers upon which the planks of the platform are fixed, (which timbers usually run lengthways of the machine,) the lateral thrust also is checked.

The improved mode of graduating the beams and weights is as follows:—The balance is of the steelyard kind, as represented at M, fig. 3. The arm has divisions upon, and a moveable poise and hook made in the usual way. Upon a rod N, suspended on a knife-edge at its extreme end, different weights may be placed, which must be adopted to the articles to be weighed.

We may now suppose the beam of the balance, with its moveable poise, to be so graduated and proportioned as to weigh any number of pounds, from one to a hundred; then the weights to be placed on the rod N, and to be of such size that they may respectively weigh one hundred, two hundred, four hundred, one thousand, or any other number of pounds, hundreds, or tons, as the case may be. The moveable poise will then give the means of ascertaining the number of pounds up to one hundred.

These numbers are given merely for the purpose of exemplifying the principle upon which the weights are graduated, and to render apparent its applicability to others of any required amount or proportion. For the purpose of obtaining an exact counterpoise to the platform and bringing the beam into the due horizontal position, a rod or bar *e*, with a screw nut thereon, and a cylinder or other formed weight *f*, with a female screw passing through its centre, is placed thereon. The screw *e*, extends along and is parallel to the beam, or rather to a line uniting the joints of suspension. By turning the weight *f*, so as to move it along the screw, the beam and platform may be counterpoised with the utmost precision. When the screw rod is placed upon that part of the beam represented in

the drawing, the arms, by which it is attached to the graduated part of the beam, are bent or curved out of the way of the hook of the counterpoise, at the opposite end of the beam, so as to allow the regulating weight to be placed thereon, where it will be entirely out of the way of the graduations, or it may be placed on other parts of the beam.

If it should be found desirable to allow the standards to oscillate in a small degree, to accomodate themselves to the movements of the rockers,—that may be effected by attaching the standards to the sills by a joint having a small extent of action.

When these improved weighing machines are constructed for the use of warehouses, stores, &c., for general purposes of weighing merchandise, the forms of the apparatus and the directions of the levers may be modified in such a way as to render it, in some respects, more convenient than the one just described.

The accompanying drawing, will serve to exemplify the kind of modification. Fig. 11, is a plan view of the machine with the platform in its place. Fig. 12, is a view of the under side of the platform. Fig 13, a plan of the machine when the platform is removed. Fig. 14, is a lateral view, the outer part or casing being removed to exhibit the general arrangement. Fig. 15, shews a section of the box, and the frame which surrounds it to receive the platform. Fig. 16, is a detached representation of the knife-edge suspension at the junction of the levers. Fig. 17, is a similar view of the joint which is bolted to the rockers, and which is suspended from the frame surrounding the platform by a knife-edge suspension, instead of bearing upon a standard, as in the former arrangement. A, A, is the platform with the strips of iron B, B, upon its edges; C, C, are parts of the frame surrounding the platform,

which can be removed by taking out the screw *a, a,* for the purpose of adjusting and fixing the rods for preventing the thrust of the platform; D, D, are the rockers, upon one of which is fixed the two short levers F, F, and upon the other, two long levers F, F, each pair acting as single levers. Upon the rockers D, D, near their ends are bolted the bearing pieces G, G, having knife-edges, shewn at H, in fig. 17. Upon these the two parts L, L, of the platform rest.

As one of the rockers is placed lower than the other, the bearing pieces I, I, vary in their length so as to be adapted to the projecting knife-edges H, upon the bearing pins G. The parts I, I, are best made of cast iron chilled on the fire. The mode of forming the knife-edge bearings at the junction of the two pairs of levers J, J, is shewn in fig. 16, one piece K, with its knife-edge being attached to the shorter, and another to the longer levers, and a ring M, being substituted for the double hook *c*, in the first described machine. N, N, are the heads of the rods and rings which form a part of the knife-edge suspension of the hinges on the rockers.

The rod O, leading from the double lever F, F, to the balance, has its suspension formed in the manner before described. The machine is intended to be let into the ground, so that the platform may stand level therewith; and it may be so placed that the rod, leading to the balance, may pass up under a counter or otherwise, as may be preferred.

In sheet 3, the modification represented is adapted to be used as a portable scale, the outer framing being cast in one entire piece. Fig. 18, shews the machine in perspective. The pillar P, which sustains the balance and its appendage, and through which the suspension rod passes perpendicularly to the levers, is connected to the machine by bolts and screws. Fig. 19, represents a cast-iron frame or case A,

shewing the double levers E, E, and F, F, the platform being removed. This iron frame is placed upon and fastened by screws to its centre part, made of wood, and which forms the bottom part of the case. Fig. 20, represents the machine, with the platform, in its place; the dotted lines representing the rods for preventing the lateral thrust or swing, which are fastened to the timbers Z, in the middle of the machine. Fig. 21, is a view of the under side of the iron frame and the levers,—the machine in this figure being inverted. The levers are of cast iron, and each double lever, with the rocker, is one piece of casting, the pivots or knife-edge joints being of steel, and projecting laterally, as at *c, c,* to receive the bracing pieces upon the platform. The mode of connecting the levers is the same as that described at fig. 16. Fig. 22, is a side view of the double levers F, F, shewing the manner of suspension by means of loops and staples riveted to the iron frame at each corner.

In adapting this improved construction of machinery to the purpose of weighing boats and barges, with their cargoes, in canal locks, it is only necessary to extend the arrangement of double levers and rockers upon a platform of sufficient length to support the boat or barge. Fig. 23, exhibits a diagram or arrangement suited to the purpose; *a, a, a,* are the platforms; *b, b, b,* the longer double levers; *c, c, c,* the shorter levers, bearing upon the fulcrums, as described in the preceding figure. The outer ends of the levers *b, b,* are connected, by knife-edged fulcrums, to a cross beam *d,* from the centre of which the rod, leading to the index beam, is connected.

The points which are claimed as new, and as improvements upon the platform weighing machines, hitherto used, are the following:—The construction of that part of the machine denominated the rocker, with the manner of

arranging the levers and attaching them to the rockers;—the manner of constructing the joints, with their knife-edges, and of allowing that part of the joint called the standard E, to vibrate, for the purpose hereinbefore described; and the use of the adjustable weight *f*, upon any part of the beam of the balance for the purposes described.

It is manifest that the improved combination, consisting of the platform, its levers, and joints, may be employed in connection with a balance, constructed and graduated as in the ordinary weighing machine; and that the balance, with its adjusting piece, constructed and graduated upon the principle herein described, may be applied to other weighing machines. These combinations therefore are claimed, both jointly and separately; and I hereby declare, that I do not intend to confine myself to the exact form of constructing the various parts of the machine, shewn in the drawings, but allow myself the right to vary the same, as may be found convenient, in any way which may produce similar effects, by the application of the same principles.—[*Inrolled in the Rolls Chapel Office, April,* 1834.]

Specification drawn by Messrs. Newton and Berry.

To STEPHEN ROGERS, *of the city of Bristol, merchant, for certain improvements in building the walls of houses and other edifices.*—[Sealed 16th September, 1839.]

THE object of my invention is to economise both materials and time in the building of walls of bricks, or other regularly formed blocks of earth or stone, or other suitable materials; and this I effect in the following manner:—

Let it be supposed that an ordinary nine-inch wall is required to be constructed,—I commence by forming a foundation in the usual manner, that is, by laying single

bricks or other material, so as to constitute solid nine-inch work. This done, I place on the foundation the larger portion of the bricks, or other blocks, edgewise, in close connection at their ends and sides,—their broad flat faces standing perpendicular, and leaving a hollow space between the back and front ranges of such bricks, &c. placed edgewise; and in order to strengthen the work, and give it a sufficient degree of stability, I place a tie-brick, transversely, in the wall, at every third brick of the back and front ranges, and thus hold or connect the two sides or faces of the wall firmly together.

In order that my invention may be more perfectly understood, I have shewn in the annexed drawing the manner of placing the bricks or other blocks of which the wall is constructed.

Plate IX., fig. 1, is a plan of a portion of a brick wall, and fig. 2, an elevation of the same, in progress of erection, according to my improvement. *a, a, a,* is the foundation, formed of solid work in the ordinary manner, as above described; *b, b, b, b,* the bricks placed on their edges upon this foundation, which are tied or firmly connected together in their proper situations by the transverse bricks *c, c, c.*

The ordinary dimensions of a brick are as follow:—nine inches long, four and a half inches wide, and two and a half inches deep. It is therefore obvious, from the difference between the width and depth of a brick, that if the bricks are placed on edge instead of being laid flat, as heretofore has been the practice, that fewer courses of bricks will be required to construct a wall of a certain height and thickness; for instance.—If it be desired to build a wall six feet in height, it would require, according to the old method, rather more than twenty-eight courses of bricks, each brick being two and a half inches deep; but, according to my method, I construct a wall, of the same height, with no

more than sixteen courses, each brick being placed on its side, forming a surface of four and a half inches deep.

It must also be understood, that by this method I not only economise the bricks, or construct a wall of a certain altitude and length with a smaller number, but a lesser quantity of mortar is required; and, owing to the materials and work being thus economised, a bricklayer will be able to construct a wall in a much shorter time, and at a considerably reduced cost.

When houses have been erected upon this plan, the internal surfaces of the walls may be finished by the workmen rubbing off or removing, by the friction of a common brick, any irregularities that may be observed on the surface of the work; and it will then be found that the internal surfaces of the walls may be papered in the ordinary manner without having received any coating of plaster, which will be a further saving of materials and workmanship.

If a wall of greater thickness be required, such extra thickness may be obtained by making the tie-bricks of a length equal to the thickness required.

From calculations and experiments that I have made, I find that a saving of one-third in bricks, one-third in mortar, and the whole of the internal plastering is obtained; thus making a total saving of at least twenty-five per cent. in building a house, with the further advantage of the house being dry enough to inhabit, without danger, within a shorter space of time from the period of its erection; as owing to the walls being hollow, they dry much quicker than walls constructed in the ordinary solid manner.

Having now described my invention, and the mode of carrying the same into effect, I wish it to be understood that I claim, as the invention secured to me by the hereinbefore in part recited letters patent, the sole right of con-

structing hollow walls of bricks or other blocks, in any situations, and for any purpose, in the manner above described;—that is, by placing the bricks or blocks on edge, and securing them in their positions by transverse tie-bricks, placed at intervals, by means of which contrivance I economise both labour and materials in such erections.—[*Inrolled in the Rolls Chapel Office, March,* 1840.]

Specification drawn by Messrs. Newton and Berry.

To Alphonse Rene Le Mire De Normandy, *of Cheapside, in the city of London, D. M., for certain improvements in the manufacture of inks and dyes.*—[Sealed 1st August, 1839.]

In the specification of this patent there are five distinct improvements or methods of obtaining inks and dyes, applicable to dyeing, staining, and writing.

The first improvement is for a method of superseding the use of nut-galls, and of correcting the green and brown precipitates obtained from a combination of gallic acid and sulphate of iron, as in the manufacture of the common black inks now in use.

Secondly, for a method of treating campechy wood, (Hæmatoxylon Campechiacum,) for the purpose of obtaining a beautiful purple colour, called by the patentee, the "King of Purples."

The third improvement is for a method of rendering Chinese blue, or cyanoferruret of iron soluble, so as to render it applicable to the manufacture of inks and dyes.

The fourth improvement is for the production of a solid or semi-solid soluble ink, which, being in a solid form, may be easily rendered fit for use, as a writing ink, by adding a sufficient quantity of liquid.

The fifth and last improvement consists in combining carbon with certain acids for the production of a really indelible ink, which cannot be effaced by any chemical agent.

For the first improvement, instead of using nut-galls, the gallic acid is obtained from sumac, elm wood, chesnut, beech, willow, poplar, catechu, cherry, plum, or any other wood or berry, that contains gallic acid, or tanning, or both. The wood to be used, being first reduced to powder, is steeped in water, and combined with the hereinafter named substances, in about the following proportions. It is here observed, however, that the various woods require different quantities of water, according to their solubility; for instance, catechu being nearly entirely soluble as water, will require a greater quantity than sumac; the patentee has therefore only given the proportions to be observed when sumac is used.

To make 340 gallons of ink, take from 12 to 15 sacks of sumac, of four bushels to the sack, and having obtained the decoction, add 200 weight of campechy; 80 lbs. or perhaps 100 weight of gum arabic; 100 weight of sulphate of protoxide of iron; acetate and hydrate of protoxide of copper, 4 lbs.; sulphate of alumine and potash, 37 lbs.; and of sulphate of indigo, 6 lbs.;—the quantity of this latter may be regulated according to the required intensity of the colour. If catechu is employed, then 100 weight will be found sufficient.

To produce a purple colour, called the "King of Purples," the following proportions must be observed:—To 12 lbs. of campechy wood add as many gallons of boiling water; pour the solution through a funnel, with a strainer made of coarse flannel, on to 1 lb. of hydrate or acetate of deutoxide of copper, finely pulverized, (at the bottom of the funnel a piece of sponge is placed); then add imme-

diately 14 lbs. of sulphate of alumine and potash, and for every 340 gallons of liquid add 80 lbs. of gum arabic or gum Senegal.—Let these remain for three or four days, and a beautiful purple colour will be produced.

The third improvement consists in an improved method of operating upon Chinese blue or cyanoferruret of iron. The cyanoferruret of iron is to be ground in water with oxalate acid, or bi-oxalate of potash, adding gum arabic in the following proportions:—To 7 oz. of water add 3 drachms of Chinese blue, 1 drachm of oxalate acid of potash, and 1 drachm of gum arabic,—to these ingredients a solution of tin may be added.

To make a solid or semi-solid soluble ink, which constitutes the fourth head of the invention, salts of iron of alumine and potash, of copper and indigo, catechu and hæmatoxylon, are mixed together in the following proportions:—3 drachms of catechu, 1 drachm of hæmatoxylon, 10 grs. of acetate of deutoxide of copper, 1 scruple of sulphate of alumine, 1 drachm of gum arabic, 1 drachm of sulphate of iron, and a variable quantity of indigo,—all these materials must be mixed in a state of powder, and a strong solution of campechy added. All the ingredients should be well amalgamated to make a thick paste, which must be dryed in the open air or in a gentle temperature; and when dry, the paste may be cut into squares, diamonds, or any other shape, like lozenges. This mixture is intended to make the solid soluble ink; but to make it semi-solid, it is necessary to add 1 drachm of uncrystallizable sugar or molasses, for the purpose of preventing it from becoming hard.

The fifth and last improvement is for a method of combining carbon with other colours and acids for the purpose of producing a really indelible ink. To accomplish this object, the following proportions and directions must be

attended to:—Grind 24 lbs. of carbon (Frankfort black is used in preference to any other) with a mucilage formed of 20 lbs. of gum to 60 gallons of water, and after filtering it through a flannel, add 4 lbs. of oxalic acid and a variable quantity of cochineal and sulphate of indigo.

The claims set forth by the patentee are as follow:—First, using sulphate of indigo with gallic acid for the purpose of correcting the green and brown precipitates, such gallic acid being obtained in the manner above described, from sumac, catechu, elm wood, and other substances containing gallic acid or tanning, and which have not hitherto being so employed; secondly, for the method described of acting on campechy wood by means of acetate or hydrate of deutoxide of copper with sulphate of alumine, for the purpose of producing a beautiful purple colour; thirdly, using the oxalate acid or bi-oxalate of potash with a solution of tin to dissolve Chinese blue or cyanoferruret of iron; fourthly, combining catechu, hæmatoxylon, and sulphate of indigo, to produee a solid or semi-solid ink; and fifthly, combining oxalic acid with carbon, cochineal, and sulphate of indigo, to produce an indelible black ink, which cannot be defaced by any known chemical agent.—[*Inrolled in the Inrolment Office, September,* 1839.]

To JULIAN SKRINE, *of Cambridge, Esq., for an invention of certain improvements in manufacturing forks, spoons, coins, and medals.*—[Sealed April 30th, 1839.]

THE object of this invention is an economical and expeditious method of manufacturing spoons, forks, coins, and medals. The method of carrying the invention into effect may be thus explained:—

Pieces of metal of something like the shape of the articles to be produced, are in a heated state, passed between two rollers, having a pattern or ornamental device cut or engraved upon their peripheries. These rollers are called the preparing rollers, and are intended to give the required thickness to the different parts of the article, and also to stamp or impress the shape of the pattern or device thereon preparatory to their being passed through the finishing rollers, which are another pair of rollers having the pattern or device cut or engraved thereon, and are intended to complete the formation of the pattern or device given by the first pair or preparing rollers. The articles in this state are removed to a pair of dies for the purpose of straightening or giving them the shape required for spoons and forks. The articles may then be polished and finished up in the ordinary manner.

Coins and medals are produced by forming or preparing them in the first pair of rollers, so as to give, as it were, the outline or shape of the device,—the pattern or ornament being finished by the second pair or finishing rollers.

The patentee claims producing the various articles abovementioned, by means of rollers having the pattern, ornament, or device cut or engraved on their peripheries.—*Inrolled in the Inrolment Office, October,* 1839.]

To RICHARD LAMB, *of David-street, Southwark, in the county of Surrey, gentleman, for his invention of improvements in apparatus for supplying atmospheric air in the production of light and heat.*—[Sealed 15th March, 1839.]

IN order to keep up a regular and constant blast to a lamp or fire, a quantity of atmospheric air is forced by a pump

or other mechanical means into a reservoir, furnished with a stop-cock to regulate the supply. The air is expressed from the reservoir by means of a weight or other convenient power, and is conveyed by a pipe to a lamp, fire-place, furnace, or other situation where a blast may be required. By this means a constant and undeviating supply of air is obtained, instead of the sudden puffs given by a bellows of the ordinary construction.—[*Inrolled in the Inrolment Office, September,* 1839.]

To Moses Poole, *of Lincoln's-inn, gentleman, for improvements in the manufacture of soap by the application of materials not hitherto used for that purpose.*—[Sealed 4th June, 1839.]

This invention relates to the application of a certain product to be obtained from digesting fish, or portions of fish, in a Papin's or other digester. Any description of fish may be used, if the cost of obtaining them should not be too expensive; but herrings and sprats are preferred.

Immediately that the fish are obtained, or as soon after as possible, they should be submitted to the action of the digester. As this operation is exactly the same as the method employed for digesting bones, the patentee has not considered it necessary to describe it, as this latter process is well known.

The fish, covered with water, remains in the digester for from seven to eight hours, and is subjected to the action of steam, at a pressure of from 50 to 70 pounds on the square inch. The product obtained by this process is then mixed in the boiler with the required quantity of alkali,

and manufactured either by itself, or in combination with tallow, or other saponaceous, into soap.

In the specification, the application of fish to the manufacture of soap is distinctly disclaimed, as forming no part of the invention; as the application of such materials is devoid of novelty.—The claim set forth is for the application or a *certain product* to be derived from digesting the fish without alkali in a Papin's, or other digester.—[*Inrolled in the Inrolment Office, December,* 1839.]

To William Colchester, *of Ipswich, in the county of Suffolk, merchant, for an improved soap frame.*—Sealed 29th July, 1839.]

The frames, usually employed in the manufacture of soap, are made of wood, bound with iron, for the purpose of strength. Wood, however, being a very bad conductor of heat, it generally requires from six to eight days to allow the soap to become sufficiently cool to be removed from the frame. Instead of wood, therefore, the patentee employs stone, slate, or marble, which being good conductors of heat, the soap, in frames made of these substances, will cool in a much shorter time,—24 hours being generally found long enough for the soap to become hard. Although other materials are mentioned, the patentee prefers slabs of slate, properly held together by ties.—[*Inrolled in the Inrolment Office, January,* 1840.]

To Thomas Todd, *of the borough of Kingston-upon-Hull, gentleman, for improvements in propelling vessels.*— [Sealed 19th September, 1839.]

This invention is described by the patentee in the following manner:—

Plate IX., fig. 1, is a front vertical section, on a small scale, across the paddle-wheel shaft of a steam vessel, and shews the constant vertical position of my improved paddles during the revolution of the paddle wheel. The paddles, No. 5, are just entering the water; at No. 4, they are at their deepest immersion, and at No. 3, just leaving the water. The paddles, in this figure, are represented as plain three-fold paddles. (See fig. 3.)

Fig. 2, is a perspective view of a three-rimmed paddle wheel, and shews the constant vertical position of the plain single paddles, as placed or fixed in both divisions of the wheel during its revolution.

Fig. 3, is another perspective view of a three-rimmed paddle wheel, similar to fig. 2, shewing the manner of placing any number of paddles on the arms or spokes and rims of the paddle wheels at present in use; but the number of such places will of course depend on the number of arms or spokes in the wheel, and other circumstances. Only three sets of three-fold paddles, as placed in one division of the wheel, are shewn in this figure.

The paddles in these three figures, 1, 2, and 3, are to be considered as my improved paddles, as seen in figs. 4 and 7; being represented as plain or straight paddles, in figs. 1, 2, and 3, to prevent confusion in the drawing. Only six places for paddles are shewn for the same reason. The arrows shew the direction in which the wheels rotate.

Fig. 4, is a front view of one form or shape of my improved paddle, made of boiler plate. It is formed into

zig-zags or angles, as in the figure, or in a curved shape, as in fig. 7. *a, a,* is an axle, passing through the centre of the paddle, lengthways, and securely fixed thereto. The gudgeons *a, a,* at each end of the paddle, are turned and move in brasses, which are securely fixed to the arms or spokes and rims of the common paddle wheels at present in use. By this arrangement very few alterations will be necessary in adapting my improvements. *b, b,* shews the top or upper side of the paddle, and *c, c,* the bottom or lower side. *c, c,* is weighted, so as to keep those paddles that are not immersed in the water, during the revolutions of the wheel, in a vertical position.

Fig. 5. is a bird's-eye view, and shews the top or upper edge *b, b,* of fig. 4. The side *e, e,* is the head stroke propelling the vessel forward; and the side *d, d,* shews the back stroke propelling the vessel astern.

Fig. 6, is the front view of a plain paddle.

Fig. 7, is a bird's-eye view of another form or shape of my improved paddle, on a large scale. The same letters refer to the same parts, as in fig. 5.

It will be seen, on a careful examination of the drawings and description, that my improved paddles are extremely simple, self-adjusting, and do not require the mechanical aid of any stops, cranks, levers, rods, grooves, excentric wheels, pinions, chains, or any other kind of machinery; and that the tail or back-water, as well as all extra friction, is hereby avoided.

This is not the case with the common paddles at present in use; the said back-water being universally acknowledged to be a very great drawback on the effective power of the engines.

My improved paddles, by entering the water vertically, or nearly so, will not occasion that tremulous motion common at present in steam vessels, so injurious to them, and

so much complained of by passengers. By leaving the water in the same vertical position, the swell of the back-water is avoided, and consequently, the great danger to boats, &c. in approaching the steam vessel under way.

With my improved paddles it matters not how deeply the vessel be loaded; but with the common paddles, the deeper the vessel the greater is the weight of back-water to be raised, thereby occasioning danger to the machinery and loss of speed.

My improved paddles begin their horizontal propelling action at the moment of their immersion, and continue the same until they leave the water; this is not the case with the common paddles.

My improved paddles can be readily fixed to the wheels at present in use, and will be found a very great desideratum to steam navigation.

In rivers and canals they will be found invaluable, as the injury to the banks, occasioned by the great swell of the common paddles, will be avoided. They may also be applied to tide and other water mills with great advantage.

I claim, as my invention, the peculiar shapes and forms of the paddles, as shewn; and also the manner in which they act, as self-adjusting, without the mechanical aid of stops, levers, cranks, rods, &c. &c. I disclaim the use of the parts shewn, as not *separately* constituting part of my invention. I make the paddles of iron, wood, or any other suitable substance, and of any size, and in any number, according to the size of the paddle wheel, and other circumstances. I also claim fixing two, or any greater number of my paddles, on all or any of the spokes or arms of the wheels, as shewn in fig. 3.—[*Inrolled in the Inrolment Office, March* 1840.]

To JONATHAN FELL, *of Workington, in the county of Cumberland, for improvements in building ships and other vessels.*—[Sealed 5th August, 1839.]

THIS invention is simply employing an improved kind of fastening to connect the beams to the sides of a ship, either in combination with, or without the common knee-joint.

Plate IX., fig. 1, represents a section of part of the side of a ship, with a beam connected to it by the improved fastening; fig. 2, is a plan view of the same; and fig. 3, is a cross section.—*a, a,* is the ship's side, and *b, b,* the beam.

The improved fastening consists of a plate of cast iron *c, c,* made flat on the side that is to come in contact with the wood, and having a raised part *d, d,* formed along the centre of the outer side. At that end of the plate which is to be placed against the ship's side, an abutment piece *e, e,* is formed by turning up the end of the plate.

When it is required to affix these fastenings, the abutment piece *e,* is forced close against the ship's side, (as seen in the figures,) and the plates *c, c,* being tightly fixed to the beam by bolts or nails *f, f, f, f,* a long rod or bolt *g,* is passed through a hole made in the raised part *d, d*; one end of this bolt is formed like a screw, and at the reverse end a head is made.

It will be therefore evident, that upon screwing the nut *h,* on to the bolt, the beam will be drawn tightly against the side of the ship, and that nothing can move it unless the bolt breaks.

In the figures, the improved fastening is employed in combination with the common knee-joint, which supports the beam from beneath; but this knee-joint may be en-

tirely dispensed with, and one of the fastenings used in its place, if thought desirable.—[*Inrolled in the Inrolment Office, February,* 1840.]

To George Edmond Donisthorpe, *of Leicester, in the county of Leicester, worsted spinner, and* Henry Rawson, *of the same place, hosier, for their invention of certain improvements in the combing of wool and other fibrous substances.*—[Sealed 3rd April, 1835.]

This patent is merely for a peculiar motion to be given to the combs for combing wool and hair.

The invention or improvement may be thus described, (see Plate IX.):—The figure in the plate represents a longitudinal section of the machine. *a, a,* is the frame-work of the machine; *b, b,* are two cog wheels, gearing into each other, and mounted in suitable bearings in the frame-work. To each of these wheels pins or studs *c, c,* are attached, and bear against the arms *d, d,* projecting downwards from the carriages *e, e,* which carry the combs *f, f.* These combs are held in their proper situation by levers, and the carriages slide along grooves formed in the frame-work, as will be hereafter descrbed. A rope *i, i,* is attached to the carriages, and being passed over pullies *j, j,* is kept distended by a weight *k,* below.

Another set of combs *l, l,* mounted in the frame *m, m,* is intended to be raised and lowered, for the purpose of laying the wool amongst the teeth of the combs *f, f.*

Referring to this part of the invention, the specification says, in order to obtain the upward and downward motion of the combs, the framing is affixed to the spindle *n,*

which moves perpendicularly through openings in the cross-head and cross-framing, to the top of which one end of a strap is attached, and from the other end a weight is suspended. The combs are raised by the pin or studs *c, c,* striking against the lower end of the spindle *n*, and raising it up.

The machine is set in motion in the following manner:—A quantity of wool is to be placed on the combs *f, f,* and *l, l,* and the first part of the motion raises the combs *l, l,* out of the way of the combs *f, f,* which will, by the gravity of the weight *k*, be drawn towards the centre of the machine immediately that the studs *c, c,* release the lower ends of the carriages. Upon the carriages running towards the middle of the machine, they will be stopped by the guage or stop-plate *o*, which regulates the distance between them. This plate is raised one step at every revolution of the machine, so that every time the carriages run in they approach nearer to each other. The stop-plate continuing to rise will eventually present parallel surfaces for the carriages to run against, and will continue so to do until they rise sufficiently high to disengage a lever, which will stop the machine, and the combed wool must be removed, and a fresh supply put in its place.

In the claim to the specification, the patentees say:—"From the foregoing description it will have become evident, that the object of our invention is to obtain the peculiar motion of the combs; and it will be evident to any intelligent mechanic, that the details, by which such movements are obtained, may in some degree be varied, and yet the same results will be obtained. We therefore, do not confine our invention to the precise arangements of details herein described, though they are the best that we are acquainted with; but we claim giving to the combs the peculiar motions herein described; and although the

principal object of our invention is to comb wool, yet it will also be found useful for combing goat-hair."

"In conclusion we would state, that we do not claim any of the parts, separately, of which the machine is composed, or in combination, otherwise than when they are to be used for obtaining the object of our invention."—[*Inrolled in the Inrolment Office, October*, 1835.]

To Henry Ross, *of Leicester, worsted manufacturer, for his invention of improvements applicable to the combing of wool and goat-hair.*—[Sealed 6th May, 1837.]

The specification of this invention is a very long affair, the description extending over several skins of parchment, and is illustrated by five elaborate sheets of drawings; and as we could not give a very intelligible account of all the minutiæ described by the patentee without trenching too largely upon our space, and giving several sketches of different views of the machines, we shall content ourselves by giving the claim, as set forth in the specification.

The inventor does not claim any of the parts separately, as they are all well known, and are employed in the combing machines now in use; but he claims, firstly, combining the parts shewn into a machine for filling combs in the process of combing wool and goat-hair; secondly, the mode of combining the combs with a suitable rovolving apparatus, carrying a series of combs, with wool or goat-hair, for the purpose of combing wool or goat-hair; and thirdly, the application of gas for heating combs for combing wool or hair, when the same is so applied, as to heat the combs as they move along,—to be filled by any suitable means; and

also for heating the combs through which the wool or hair is drawn in the act of combing.—[*Inrolled in the Inrolment Office, November,* 1837.]

To Henry Ross, *of Leicester, worsted manufacturer, for his invention of improvements in machinery for combing and drawing wool, and certain descriptions of hair.*—[Sealed 18th July, 1838.]

The specification of this patent is much longer than the above, and has nine sheets of drawings accompanying it to illustrate the different improvements.

The machinery in the present but very little resembles that described in the former specification. There is not, however, any specific claim in the specification, except to the combination of the machinery for combing and drawing, as shewn and described.

The first improvement is for combining a machine for filling the combs with wool or hair, with a machine for combing, so as to form but one machine. The two machines however may, if required, be made separate, and the combs filled with hair may be taken by hand from the preparatory machine and placed in the drawing and combing machine.

The preparatory machine, or apparatus for filling the combs, may be thus described:—It is constructed somewhat in the form of an ordinary carding engine; the wool or hair is conducted into the machine between two fluted feeding rollers by an endless cloth, and is taken up by a series of carrying rollers, furnished with stout projecting bent steel points; these rollers being mounted in a circular revolving frame, similar to a card cylinder, are in succession

brought before the pair of feeding rollers, and by means of their projecting steel points or teeth, they tear or carry away a portion of the hair or wool, which is protruded from between the feeding rollers.

Each carrying roller has a slow rotary motion given to it by means of a shaft, one end of which is furnished with a mitre wheel, gearing into another mitre wheel on the end of the axis of the carrying roller; and the other end has a wheel, which is set in motion by a snail on the driving shaft of the machine. These rollers are intended to carry the wool or hair from the feeding rollers, stationed at one end of the machine, and to place it on the combs, situated at the other end.

In order to transfer the wool or hair from the carrying rollers to the combs, it is necessary to remove it entirely from the said rollers before they reach the combs, in order that they may be allowed to pass the combs freely;—this is effected by radial arms extending from the centre of the machine, attached to and revolving with the rotary frame; each of these radial arms has a brush, formed of very long bristles affixed to its end, and is placed immediately behind each carrying roller. As the rotary frame revolves, carrying the rollers full of hair, these radial arms are, by means of cam wheels, situated on each side of the revolving frame, forced forward, so that the bristles at their ends, enter between the steel projecting points of the carrying rollers, and clear the said rollers of all the wool or hair they contain or hold. The bristles, in their turn, are then cleared of the wool or hair by the combs, which are placed in a proper situation to receive it.

The combs are moved slowly in a lateral direction by means of a small pinion that works in a rack, formed on the under part of them.

It should be observed, that previous to the combs being filled with wool or hair, they are warmed by being passed through an oven, heated by pipes, having small holes for jets of gas formed in them. The combs being filled, as before described, are carried, either by machinery or by hand, to the combing or drawing apparatus.

We will now describe the combing machine:—In this arrangement of apparatus, the combs are placed vertically in a frame, which, as parts of the combs become filled, is raised or lowered by means of a screwed shaft, placed in the centre,—the entire weight of the frame being counter-balanced by a heavy counter-balance.

Several separate combs may be used in this machine, which consists of two metal plates, an upper and an under plate, having cogs or teeth formed on their edges, to gear into the driving and other wheels, as will be hereafter mentioned. These plates are mounted on an upright hollow shaft, through which another shaft is passed for the purpose of guiding and steadying the frame, as it is raised and lowered. This frame is made to revolve, horizontally, by wheels gearing into the teeth formed on the edges of the upper and under plates, before mentioned.

When the machine is to be set in motion, the combs being in the vertical position, the frame is raised to its greatest height by means of a handle, which turns a small pinion that works in an upright rack;—the frame is balanced in this position by a large weight, as before stated. In this situation, a few of the undermost of the teeth of the combs are brought opposite the combs that have been filled with wool or hair, and the machine being set in motion, the vertical combs will commence dragging the wool or hair from the horizontal or full combs, and by this means fill themselves;—a further and fresh number of teeth being

continually brought into contact with the wool by means of the snail-shaft before mentioned, which causes the frame to descend gradually.

In this arrangement of apparatus, the combs are warmed by ignited jets of gas, issuing from pipes, which nearly surround the machine.

The combs have an oscillating or reciprocating motion, as well as the rotary motion of the frame, given to them by proper gearing, which works in segment racks, placed either above or below them. This motion is given to them to make a drag or pull, when they come in contact with the wool or hair.

In another arrangement or modification of the same description of apparatus, the rotary frame that carries the combs which comb or tear the wool from the full combs, is mounted in a horizontal instead of a vertical position.

There is also a different method proposed of giving to the combs in the rotary frame a slight oscillating motion of their own, independent of the motion of the rotary frame. As, however, the difference between this and the one already described, in which the required motion is given by segment racks, is but very slight, it will not be necessary to describe it.

The patentee does not claim any of the parts separately, but confines his claim of invention to the combination of apparatus for preparing and filling the combs and combing wool, as above described.—[*Inrolled in the Inrolment Office, January,* 1839.]

To MATTHEW UZIELLI, *of King William street, in the city of London, merchant, for an invention of certain improvements in the modes of impregnating wood or timber, with chemical materials; being a communication from a certain foreigner residing abroad.*—[Sealed 17th August, 1839.]

THE wood or timber to be impregnated should be cut down when the sap is circulating freely, and the tree is in full leaf. The lower end of the tree is to be placed in a reservoir containing some suitable chemical preparation in a fluid state, and the liquid will be found to circulate freely through the entire tree, and impregnate it in every part.

The patentee does not claim any particular chemical preparation to be employed, but recommends unrefined pyrolignites, or acetates of iron and copper, or creosote. A solution of chloride of sodium (common salt) or chloride of calcium, may be used with advantage;—these latter materials will prevent the wood from warping. (Any description of chemicals may be employed either to prevent dry rot or to prevent the wood from being inflammable.)

The timber should be impregnated directly it is felled, or as soon afterwards as possible;—it may be impregnated just as it lies, by tying a bag, made of waterproof cloth, round the end of the tree, and keeping it well filled with the solution; or the timber may be placed upright in a vessel containing a quantity of the chemical preparation. It will not be necessary to put more of the solution in the vessel than is sufficient to cover the bottom of the tree for a few inches, and, in general, ten days will be found sufficient to impregnate the tree, but this must, in some degree, depend upon the age and species of the tree, and the time of year. By this mode of impregnating, many

different sorts of white woods may be dyed or stained a variety of colours, so as to present a very beautiful appearance.

The patentee does not claim the use of any particular solution, but only the *methods* of impregnating timber as described,—namely, by allowing the chemical solution to circulate freely with the sap.—[*Inrolled in the Inrolment Office, February,* 1840.]

To James Warne, *of Union-street, in the borough of Southwark, pewterer and beer-engine manufacturer, for his invention of certain improvements in engines or machinery for raising, drawing, or forcing beer, ale, and other liquids or fluids.*—[Sealed 17th July, 1834.]

In beer engines of the ordinary construction, the valves and other parts of the machinery are apt to become clogged and disarranged by the introduction of some foreign solid matter, which often causes the valves to leak. This invention, therefore, is intended to obviate the inconvenience arising from these causes.

The first improvement set forth, is a perforated plate or guard sieve, which being placed immediately below the valve, prevents the passage of any adventitious matters in a solid form, and of any size.

The second improvement, is the adaptation of one or more additional valves, so that should any particular valve, by any unforseen occurrence, be disarranged and put out of order, the others will work freely and allow the engine to be used without inconvenience, until such valve shall be repaired.

The third improvement is for a new combination of

levers to actuate the pump; but in order that this arrangement may be more clearly understood, it will be necessary to refer to Plate IX., in which fig. 1, represents a section of a beer-engine constructed upon the old principle; and fig. 2, a section of part of a counter with the new arrangement adapted thereto. The advantages to be derived from the use of this arrangement are, firstly, that it may be with facility attached to a common counter, thus obviating the necessity of having a regular beer-engine; and secondly, that it occupies less space, which will be found a considerable advantage in the bar-rooms of public houses.

There are two other modifications of the above, shewn in the specification, but they are all upon the same principle, and so very similar, that it will not be necessary for us to describe them.—[*Inrolled in the Inrolment Office, January*, 1835.]

To JAMES BOGARDUS, *of Trinity-square, Tower-hill, in the county of Middlesex, gentleman, for his invention of improved means of applying labels, stamps, or marks to letters, and such other documents.*—[Sealed 26th August, 1839.]

THIS invention is one of the many plans which have lately appeared, in consequence of the attention that has been given to the subject of prepaying letters, in order to meet the views of the Stamp Office for carrying out Mr. Rowland Hill's new postage regulations.

The object, in this case, is to annex a stamped or printed label to letters or other documents by means of the seal alone, thereby avoiding the use of adhesive or gummed labels, such as are ordinarily used by chemists and others. The patentee describes his invention as follows:—

If a wafer be used, I cover a portion of the label with part of the wafer, and the other part of the wafer may be used to seal the letter,—the same may be done if wax is used; but a better method is to cut a hole in the label, which hole being placed where the wafer or wax is placed to seal the letter, the act of sealing affixes the label; and this method may be applied to other documents.—[*Inrolled in the Inrolment Office, February,* 1840.]

To William Vickers, *of Firs Hill, in the county of York, steel manufacturer, for an improvement in the manufacture of cast steel,—being a communication from a foreigner residing abroad.*—[Sealed 25th June, 1839.]

This invention is described as consisting in the manufacture of cast steel, at one process, out of borings or turnings of wrought iron, (a cheap and refuse material not heretofore used for that purpose,) or out of small wrought iron scraps, such as old horse-shoe nails, broken bits of wire, and the like, by the introduction of oxide of manganese and carbon.

In order to make cast steel on the said improved plan, ordinary furnaces and crucibles, heats, and moulds, may be used; (I prefer, however, a slightly increased temperature,) but instead of melting in these crucibles, broken pieces of the bar steel, commonly called blister steel, as heretofore, from which to make the cast steel ingot, I melt the following ingredients together, in the following proportions; that is to say,—1 of ordinary wrought iron turnings or borings, or scraps, 100 lbs.;—2 of black oxide of manganese, 2 lbs.; —3 of best ground charcoal, 3 lbs.;—or, instead of the

ground charcoal, cast iron turnings or borings, or other small particles of cast iron may be used, in which case the following will be the proper proportions; that is to say,—1 of ordinary wrought iron borings or turnings, or scraps, 100 lbs.;—2 of black oxide of manganese, 2 lbs. 3 oz.;—3 of cast iron turnings or borings, or other such very small particles of cast iron, 28 lbs.

Now whereas it is evident that the foregoing proportions may be, in both cases, susceptible of some slight variation, dependent on the quality of the ingredients used;—and it is only necessary further to observe, that if turnings are used, they should be pounded into small pieces before they are put into the crucible.

But I claim, as the invention aforesaid, the manufacture of cast steel, at one process, from borings of wrought iron, or from turnings of wrought iron, or from wrought iron small scraps, melted up with oxide of manganese; and also with carbon, or with cast iron turnings or borings, or other such very small particles of cast iron, instead of the charcoal, as hereinbefore mentioned.—[*Inrolled in the Inrolment Office, December,* 1839.]

New Voltaic Battery.

A few evenings ago, a Voltaic Battery, upon a new and improved construction, was exhibited at a meeting of the Members of the Society of Arts, and gave great satisfaction. It is the invention of Alfred Smee, Esq., and constructed by Mr. Palmer, of Newgate Street.

The inventor calls it a "Chemico Mechanical Battery," and the peculiarity of construction consists in coating the negative

plate with a layer of finely divided platinum, which not only insures perfect contact with the exciting liquid, but from the immense numbers of points which it presents, causes the most violent and intense action, which however ceases immediately the circuit becomes broken. It excited very great interest, and is well worthy the attention of gentlemen interested in this branch of science.

The advantages of this new battery are so very great, that it must, we should imagine, supersede all other constructions at present known. Instead of the trouble and inconvenience arising from the use of solutions of sulphate of copper and muriate of soda, as in the batteries now in use, it requires only one sort of exciting liquid, and that of the cheapest and cleanest kind, namely,—dilute sulphuric acid, mixed in the proportions of one part by weight of acid to eight of water; the battery does not require any trouble to keep in order, for when the apparatus is done with, it only requires to be taken out of the liquid, and is always ready for use, at any period, however distant. Through the kindness of Mr. Palmer, we have had an opportunity of witnessing the surprising effects of this battery.—It consists of 24 pairs of small plates, and an earthenware trough for holding the acid solution. Platinum wire, the least fusible of metals, is not only heated to a white heat, but completely and instantaneously fused. Iron wire, of considerable substance, is also instantly melted, and falls down in globules; but the most brilliant effects are produced by connecting the battery to an electro magnetic apparatus, when the combustion of different metals resembles a a display of fire-works.

Upon connecting two pieces of coke or charcoal, one to the positive and the other to the negative end of the battery, and bringing them into contact, a light nearly if not quite equal in intensity to the oxy-hydrogen light, is produced.

A great advantage to be derived from the use of this battery, is its economy, as after the first outlay incurred in purchasing the article, the cost of setting it in full action is not worth attention; the only exciting liquid being, as before mentioned, diluted sul-

phuric acid; and from the greater degree of power exerted by this battery, it will not be necessary, under ordinary circumstances, to have so large a one as must be employed for similar purposes, if one constructed in the ordinary manner be used.

We are informed, that a small one, consisting of only one pair of plates, and which may be used in a common drinking tumbler, will be found sufficient for general medical purposes, and for connection with an electro magnetic apparatus.—The cost of such battery would not exceed ten shillings.

SAWN SLATE PAVEMENT.

Experiments have been made to ascertain the applicability of slate to other uses than the covering of houses. The result has been the discovery that, as a material for paving the floors of warehouses, cellars, wash-houses, barns, &c., where great strength and durability are required, it is far superior to any known material. In the extensive warehouses of the London Docks it has been used on a large scale. The stones forming several of the old floors having become broken and decayed, have been replaced with slate two inches thick; and one wooden floor, which otherwise must have been relaid, has been cased with slate one inch thick, and the whole have been found to answer very completely. The trucks used in removing the heaviest weights are worked with fewer hands. The slabs being sawn, and cemented closely together as they are laid down, unite so perfectly that the molasses, oil, turpentine, or other commodity which is spilt upon the floor, is all saved; and as slate is non-absorbent, it is so easily cleaned, and dries so soon, that a floor upon which sugar in a moist condition has been placed, may be ready for the reception of the most delicate goods in a few hours. Waggons or carts, containing four or five tons of goods, pass over truck-ways of two-inch slate without making the slightest impression. In no

one instance has it been found that a floor made of sawn slate has given way; in point of durability, therefore, it may be considered superior to every other commodity applied to such uses. The consequences of this discovery have been, that full employment is found in the quarries which produce the slates, and that additional employment has been given to the British shipping engaged in the coasting trade.—*Mining Journal.*

Scientific Adjudication.

INFRINGEMENT OF MR. CRANE'S PATENT.

Court of Common Pleas,—April 22nd.

CRANE *v.* PRICE.

This cause was tried before Lord Chief Justice Tindal at the last Middlesex sittings, when the jury returned a verdict for the plaintiff, with liberty to the defendant to move to enter a nonsuit.

The Solicitor-General now moved accordingly.—At the trial a formal verdict was taken for the plaintiff, the learned judge being of opinion that the question turned more upon a matter of law than of fact. It was an action for the infringement of a patent. A person of the name of Neilson had obtained a patent for the application of a hot-blast for furnaces used in the manufacture of iron. The present plaintiff had, subsequently, taken out another patent for the use of the said hot-blast in connection with anthracite, or stone coal, which had previously been attempted to be employed for a similar purpose, but without effect. The mode of operation was like that under Mr. Neilson's plan, with the exception that anthracite, in lieu of common coal, was the fuel consumed. This action was instituted for an infringement

of the plaintiff's patent. The defendant pleaded not guilty, that Mr. Crane was not the inventor, that the nature of the invention was not properly described in the specification, &c. The learned counsel contended that the plaintiff's specification described a manufacture well known to be carried on by means universally practised, except that, instead of a hot air blast with common coal, Mr. Crane used one with the stone coal, or culm.

Chief Justice Tindal—It is applying a *modus operandi* known before, to produce effects also known before. You may take a rule to show cause.

The rule was accordingly granted.

In reference to the above cause, we annex the following observations, extracted from the Mining Journal :—

" The evidence given in court was very voluminous, and great part of it irrelevant to the subject ; it will, therefore, be sufficient to give the leading features and prominent parts of the cause, from which the following conclusions may be considered as being satisfactorily established ; first, that Mr. Crane was the first to establish the practicability of making iron with stone coal, used as a fuel by the application of the hot-blast ; and secondly, that the iron so manufactured is of superior quality, and more particularly as regards its strength.

The main point on which the defendants evidently depended was " Neilson's patent," and they certainly worked hard to show that this particular patent covered all manufactures, no matter whether for iron, copper, tin, lead, glass, or any fabrication where hot-blast was employed, not being satisfied with contending that Neilson's patent must be secured or adopted in the use of the hot-blast to any species of manufacture, but that the very combination of the hot-blast with any other process, whether novel or not, was embodied in Neilson's patent. Hence arises the position assumed by them, viz., that the manufacture of iron-stone from stone coal was not under Crane's patent, but that it comes under the patent taken out by Neilson, which comprehends the application of the hot-blast.

Mr. Neilson, some twelve years since, took out a patent for applying heated air, or the " hot-blast," to furnaces, forges, &c., with the view, as has been subsequently proved, of economising fuel, which as regards Scotland, was a very serious consideration, from the nature of the coal, and waste in coking. Indeed, such is the saving effected by the introduction of Neilson's patent, as applied to bituminous coal, in the manufacture of iron, that instead of using, as has been done, from seven to eight tons of coals in the manufacture of one ton of iron, the quantity now used is about two tons six cwt. exclusive of the coal required for heating the hair, which was brought to 600° Fahrenheit.

The cause was heard on 11th February last, and occupied two days, Lord Chief Justice Tindal presiding, and a special jury having been sworn.—Sir Frederick Pollock and Mr. Smith were counsel for the plaintiff, and the Solicitor-General and Serjeant Bompas for the defendants.

Sir Frederick Pollock addressed the jury at considerable length, in which, after taking a brief review of the processes adopted in the smelting of iron ores in early days, and the improvements which have taken place of late years, proceeded to point out the peculiar advantages attendant on the process patented by Mr. Crane, whereby not only was an immense tract of coal, the greater part of which extended seventy miles in length, by eight miles in breadth, rendered available for the manufacture of iron, but that the iron so made was of a quality infinitely superior in strength, and other properties, to the iron now made in this kingdom—the patent being, the application of the hot-blast to anthracite or stone coal in the blast furnace, in the smelting of iron ores, thereby lessening the cost, from the reduction in the the fuel consumed, and yielding a superior product.

The evidence may be said to be confined to one or two points, while the substance may be considered as equally testing the merits, and ascertaining the validity of Neilson's patent, as that of Mr. Crane, the object of counsel on the one side being to show that Neilson's specification was imperfect, and that he had been anticipated by Botfield, while, on the part of the defendants, the

attempt was made to show that experiments had been made with anthracite antecedent to the date of Mr. Crane's patent—and further, that, failing in such proof, then that Mr. Crane's process was simply the application of Neilson's hot-blast, the terms of the specification being of a general nature, and intended to apply to all descriptions of furnaces and forges, as well as materials employed, and thus including anthracite. Among the witnesses examined were Mr. Mushett, Mr. W. Brough, and Mr. Cottam, whose evidence is important, as proving the quality of the iron manufactured at the Yniscedwyn Works, and its superiority over other descriptions of iron, whether by the application of the cold or hot-blast, Mr. Cottam, in his evidence, giving a decided preference to cold-blast iron (the iron made by anthracite excepted,) and stating that he was in the habit of giving 20*s.* a ton more for that iron, as possessing more strength and tenacity than that manufactured from the hot-blast. From the evidence of Mr. Mushett, it appears that he had tested the strength of the iron by a series of experiments, and we shall endeavour to follow the evidence, with the view of giving the results, which were subsequently confirmed by other witnesses. Having taken a bar of a given length, and introduced one end into an aperture in a wall, to the other end a weight was suspended, so as to give the same degree of pressure throughout, and thus to ascertain the weight which the bar would carry—the bar used for this purpose was about an inch and a half broad by three quarters. The breaking weight of a bar of these dimensions, of the iron cast from the furnace in which anthracite had been solely used, was 209½ lbs.; from a similar bar, the proportion of anthracite used being two-thirds—199 lbs., and with one-third of stone coal—180 lbs.; while the average of Mr. Tredgold's experiments on iron made from bituminous coal was only 173 lbs.—thus showing a great superiority in the anthracite iron. Further on we find, from the evidence of Mr. J. C. Richardson, that he had tested the Yniscedwyn iron, in shape of chain cable, by an hydraulic machine, the strain at which it broke being nineteen tons, while the usual strain at which other descriptions of iron broke did not exceed

sixteen and a half tons. Mr. Cottam states, that he made a series of experiments about two years since, with the view of trying the comparative strength of the iron made by Mr. Crane's patent, and other descriptions which he was in the habit of using, the result of which was of a highly favourable nature; a bar of ordinary iron, four feet long and one inch square, being supported at both ends, and loaded in the middle, was found to break with a weight of 440 to 445 lbs., while the anthracite iron carried a weight of 599 lbs.—the latter bearing 1600 lbs. before it took a permanent set, while in general iron takes a permanent set at 1000 lbs. Some tender Scotch hot-blast iron broke at 403, but when mixed with some of the anthracite iron, it was raised up to 518 lbs., which was the breaking weight.

We have run through that part of the evidence which principally bears on the quality of the iron, without attempting to enter into the details which affect the question as to the legal right, which it is the object of Mr. Crane to maintain by his action. The following remarks of the Lord Chief Justice will best explain the grounds on which the proceedings were brought to a close. After expressing himself, to the effect that it resolved itself into a question of law at last, his Lordship thus proceeds:—

"I have been listening with great attention to it; it must come at last to what is the meaning of the word 'manufacture' under the statute, whether the application of a known mode of working the blast, applying it to all purposes, when applied to a known purpose, is a manufacture; and then you come to the other, whether he is the first and true inventor of it. Then it is again a question of law, whether the applying this knowledge, which is part at least of the invention, and a very important one, applying it to that which is also known, makes him or not the first or true inventor. I do not see anything to leave to the jury."

The result was, by consent of counsel on both sides, a verdict for the plaintiff for one shilling, subject to a motion on part of the defendants either for a nonsuit or special case or verdict.—Thus, again, must the subject come under discussion, and, in the

interim, the advantages to be derived from the use of the patent are lost to the public.

It is clear that the question to be determined by the Judges is one founded on the following position, advanced by the plaintiff and defendant:—

First. Whether the patent of Mr. Neilson comprehends the application of the hot-blast to any description of furnace, not confining it to the mode in which such heated air may be obtained, or the fuel employed, or the materials on which it may be employed, in coming into contact with, and bringing into a state of fusion, as in the case of smelting of iron ores with anthracite?

Second. Whether Neilson's patent is valid, or whether the hot-blast was not discovered or patented antecedent to his patent?

Third. In case Neilson's patent does not comprehend the smelting of iron with anthracite, then, whether Crane's patent is valid, if adopting Neilson's patent—assuming that the latter is good in itself, as applicable to all known modes of treating or applying it at the time of the patent being secured?

Fourth. Whether, assuming Neilson's patent not to be valid, Crane can adopt any other hot-blast, and thus carry out his patent perfectly independent of royalty to Neilson?

Thus, it will be seen, the judgment which may be given is calculated to affect Mr. Neilson in a like manner as it does Mr. Crane. Our own opinion of the equity of the matter in dispute is, that Mr. Neilson is entitled to his royalty or patent rent for the use of the hot-blast, which does not appear to us to have been affected by the inquiry; and that Mr. Crane is in like manner entitled to his patent rent for the process adopted by him, in combination with the hot-blast, to which Mr. Neilson can have no claim whatever. We should be sorry to find that either of two men, who deserve support, should be sacrificed by the question raised by the defendants, who look only to private gain, and evidently without any regard at whose cost it is acquired."

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

Annual Report.

(Continued from page 112, Vol. XVI.)

It would be vain to expect that an Annual Meeting should ever recur without the Council having to lament the removal by death of some who, by their acquirements, or by their associations of friendship, were endeared to the Institution. On the present occasion the Council have to lament the death of your Members, Mr. David Logan and Mr. Henry Habberley Price, and of your Honorary Member, Mr. Davies Gilbert. The records of the Institution contain several communications from Mr. Logan, particularly one on the new Graving Dock, at Dundee, and Mr. H. H. Price was, when in town, a constant attendant at the Meetings, and took a lively interest in the proceedings and success of the Institution. Mr. Davies Gilbert was, by his writings and his influence, a great benefactor of practical science, and the Transactions of the Royal Society, over which he presided for three years, contain several papers of great value to the practical engineer. He took great interest in the introduction of Mr. Watt's improvements in the steam engine into the Cornish mines, and in the controversy betwixt Mr. Watt and Mr. Jonathan Hornblower respecting working steam expansively, the former employing one cylinder only, the latter two cylinders, in the manner afterwards revived by Woolf; the theoretical efficiency of the two methods being identical, but simplicity and mechanical advantage being greatly in favour of the former, as its present universal adoption testifies. Mr. Davies Gilbert introduced into practical mechanics the term "efficiency" as the product of the applied force and of

the space through which it acted in contradistinction to the term "duty," as indicative of a similar function of the work performed. His attention was also directed to the theory of suspension bridges, when the plan for making such communication across the Menai was submitted to the Commissioners appointed by Parliament. It appeared to him that the proposed depth of curvature of the catenary was not sufficient, and his well-known theoretical investigation of this subject was undertaken with the view of ascertaining this fact; and in consequence of these investigations, the interval between the points of support of the chains and the roadway was increased to the height which appeared to him requisite for works of this nature. The labours of this distinguished individual for the promotion of science was unremitting. He was the founder of several societies; he was the discoverer and early patron of the talents of Davy; and while in parliament he laboured most assiduously in the advancement of all public works. Regret for such a man, exerting the power of his mind so advantageously and through so many years, must always be strong and sincere; but having obtained the ordinary limit of human life, he sunk into the grave amidst the respect and esteem of all who knew him, and has left behind him a name which will ever bear a prominent place amidst the names of those whose lives and talents have been devoted to great and noble purposes.

In presenting a statement of the Receipts and Expenditure of the Funds of the Institution for the year ending the 31st of December, 1839, the Council remark, with pleasure, that the state of the finances may be considered flourishing; but, at the same time, there still remains a debt of about £750. incurred for the alterations and improvements to the premises occupied by the Institution, and towards the liquidation of this they would solicit the assistance of those Members who have not yet contributed to the amount already subscribed.

It must be noticed that the amount possessed by the Institution in the 3 per cent. Consols remains untouched; that the House in Cannon Row is let at the advanced rent of £100. per annum,

and that some advantage has been derived from the temporary occupancy of the ground-floor of this house by the Railway Society. That Society has now relinquished these rooms, and it is proposed to retain and use them for the convenience and accommodation of the general body.

The Council now resign into the hands of the Annual General Meeting the trust which was confided to them. The review of the proceedings of the past year has been to them in the highest degree gratifying, and they trust that every one here present will have participated in that gratification. The Institution has received the accession of many valuable names during the past year, and many others will, it is hoped, be added in the year which is now commencing. But they would remind all, that it is only by individual exertions that great ends can be accomplished. They would earnestly call on all to co-operate with the future Council in the promotion of professional knowledge, and in placing the Institution in a position conspicuous amongst those which have adorned this or any other country.

SESSION 1840.

Jan. 14.

JOSHUA FIELD, V. P., in the Chair.

"Observations on the efficiency or gross power of Steam exerted on the piston, in relation to the reported duty of Steam Engines in Cornwall, at different periods."

By John Scott Enys, Assoc. Inst. C. E.

The advantages which may result from the union of scientific and practical knowledge in the application of steam power, particularly with reference to the limits of gross power, are great, as likely to check the extravagant notions entertained by some, with respect to the further increase of duty, and to remove

the disbelief of others with respect to the amount of duty actually performed.

The limit of duty for atmospheric steam may be readily arrived at, as was done by Mr. Davis Gilbert in 1827, by estimating the weight of water which would rise 34 feet into a vacuum formed by the condensation of steam of atmospheric strength; whence it appears, that a higher duty than 30 millions cannot be obtained by atmospheric steam, 14 cubic feet of water being evaporated by a bushel of coal. Tredgold, in the first edition of his Treatise on the Steam Engine, published in 1827, adopted the simpler method of multiplying the volume of steam of atmospheric strength by the pressure, for the measure of the efficiency. This principle may be extended to measure the efficiency of steam at higher pressures, as the author has shewn in the first annual report of the Cornwall Polytechnic Society; and an extended table to ten atmospheres is appended to this communication.

The author then proceeds to shew, that the Cornish engines are worked under such conditions that a large proportion of the expansive action of the steam is available on the piston, and calls attention to two necessary corrections—1st, for the deficiency of water in high steam cut off at one-fifth of the stroke; and 2d, for the increase of temperature of the steam during expansion in the cylinder, as derived from the steam jacket. The experiments of Mr. Wicksteed, confirmatory as they are of the very extended experiments made by Woolf at Wheal Alford, shew the importance of this latter correction. Some error has also arisen from the use of the boiler pressure. The exact determination of the pressure in the cylinder is difficult, and the only recorded experiments are those by Mr. Henwood with the common indicator, and published in the second volume of the Transactions of the Institution. The indicator is liable to shew a pressure higher than that actually exerted during the expansion, but it may be relied on for comparative results; and very accurate experiments made at the Consols by a mercury guage, the engine being

stopped at different parts of the stroke, are said to confirm the reliance which may be placed on the indicator.

The quantity of water evaporated, was very imperfectly recorded; it was stated by Watt as from 8 to 12 cubic feet per bushel, and at present may be stated at about 14 cubic feet, but is sometimes, with good coal and careful stoking, much higher.

The author briefly alludes to the progress of improvement in Cornwall; the introduction by Woolf of high steam; the substitution of the plunger pole for the bucket pump, and the application, so recently made by Mr. James Sims, to stamping or crank engines of the arrangements which had been a long time so advantageously in use in pumping engines.

The communication is accompanied by a table, exhibiting the weight of water per cubic foot; the pressure; the volume and the efficiency of steam from one to ten atmospheres, adapted and corrected from those of Clement and Desormes. It is also accompanied by a method of representing several particulars connected with the load and engine, by which the relation of these with respect to each other in the same engine, and the different conditions of other engines, may be at once exhibited to the eye. It may also prove a convenient method of recording facts and calculations in connexion with the Indicator Diagrams.

"Analysis of a piece of the iron heel post converted by the action of Sea Water into a substance resembling Plumbago."

By David Mushet, A. Inst. C. E.

A piece of the iron heel post of a vessel called the John Bull, had been presented last Session by Mr. Borthwick, as a curious specimen of the effect of salt water in converting iron into a substance resembling plumbago. This substance was of a dark brown colour, easily cut by a knife, and Mr. Mushet undertook to analyse it; and the result of this analysis, and the methods pursued, are the subjects of this communication. This substance, which it may be convenient to call marine plumbago, on being

exposed to a red heat in a crucible, lost about 20 per cent. in weight, and on being exposed to a white heat for four hours lost about 60 per cent., and came out a light mass of very brilliant carburet. This shining carburet was then used as a carbonaceous substance for the reduction of an oxyde of iron, but was less efficacious than the same quantity of the charcoal of wood. From these and other experiments, Mr. Mushet considers 100 parts of the so-called marine plumbago, to be composed nearly as follows:—

Carbonic acid and moisture - -	20
Protoxyde of iron - - - -	35·7
Silt, or earthy matter - - -	7·2
Carbon - - - - - - - -	41·1

Also, he considers 100 parts of the common black lead to consist as follows:—

Carbonic acid and water - -	12·5
Iron - - - - - - - - - -	11·5
Earthy matter - - - - -	4·5
Carbon - - - - - - - -	71·3

"A theoretical calculation of the Fuel saved by working Steam expansively."

By J. W. Lubbock, Hon. M. Inst. C. E. &c. &c.

An equation may be readily formed for the action till the steam is cut off; and the steam being then supposed to dilate into a certain volume, the variation in this volume gives rise to the quantity of action, whence another equation may be obtained, and the maximum of the quantity of action produced by cutting off the steam determined. The quantity of action thus produced, is then compared with that produced in any case without cutting off the steam. Now the quantity of heat or fuel expended, is proportional to the steam generated in each of the preceding cases; and a proportion, expressing the ratio of the fuel saved to the fuel expended, may be obtained.

"On the Expansion of Arches."

By George Rennie, F.R.S.

The expansion of solids, which has excited the attention of mathematicians since the investigation of La Hire, in 1688, on a rod of iron, is of particular importance in the construction of bridges, the security of which may be affected by the dilatation and contraction consequent on changes of temperature. Periodical motions, referable only to changes of temperature, were observed by Vicat in a stone bridge built over the Dordogne at Souillac, and have frequently been noticed in structures of all kinds. The different expansibility of stone and iron has been considered an objection to the use of cast-iron pillars in connexion with stone to support the fronts of buildings; but the experiments of Mr. Adie, of Edinburgh, led him to the conclusion, that no danger is to be apprehended from a change of temperature affecting cast-iron and sandstone in any great degree, as their expansion, so far as regards buildings, may be considered the same.

Arguments from this source were employed against the arches of Southwark Bridge, and the experiments set forth in this communication were undertaken with a view of ascertaining the effect of temperature on these arches.

Three sets of experiments were made: the first in Jan. 1818, when the main ribs and diagonal braces rested on their centres, and before any of the spandrils and road plates had been put upon them; the second, in August and September of the same year. The rise was measured by the insertion of small wedges to about $\frac{1}{10}$th of an inch. The third set of experiments was made on the eastern arch. Three thermometers were employed —one hanging in the open air, another having the bulb immersed $1\frac{1}{2}$ inch in the iron, and the third hanging amongst the ribs; these were observed at different hours of the day, and the results recorded. The rise of the arch was observed by a fine piece of feathered edge brass, nicely fixed to the rib, which by

the rise and fall of the arch traversed upon a scale graduated to $\frac{1}{80}$th of an inch. The tables contain experiments on nine days, with the temperatures and rise at every hour of the day. The results, that is, the maximum temperatures and rise, and rise for 1° F. are exhibited in the following table.

No. of Experiment.	Variation in Temperature.	Rise in Arch.	Rise for 1° F.
I.	15°	$\frac{25}{80}$	$\frac{1}{48}$
II.	10°	$\frac{16}{80}$	$\frac{1}{50}$
III.	7·5	$\frac{13}{80}$	$\frac{1}{47}$
IV.	11°	$\frac{22}{80}$	$\frac{1}{40}$
V.	6°	$\frac{13}{80}$	$\frac{1}{87}$
VI.	4·5	$\frac{10}{80}$	$\frac{1}{36}$
VII.	3°	$\frac{9}{80}$	$\frac{1}{26}$
VIII.	8°	$\frac{14}{80}$	$\frac{1}{45}$
IX.	7·5	$\frac{21}{80}$	$\frac{1}{28}$

The mean rise is $\frac{1}{40}$th of an inch for 1° F.

Mr. Rennie then proceeds to calculate the theoretical rise from the expansion of iron, according to Lavoisier, in an arch of the dimensions of Southwark Bridge, for 50° increase of temperature.

The effects of changes ef temperature were also observed in the stone bridge over the Thames at Staines. After the arches had attained their full settlement, openings were observed in the joints of the parapets immediately over the springing of the arches, and a distortion or sinking of the upper curve of the parapets. A wedge was inserted into some of these openings, and the lowest point of its descent in the month of January marked. The same wedges were carefully inserted every week until May, when they would no longer enter, and the joints became firmly closed. At this period, however, the joints im-

mediately over the crowns of the arches, which had during the winter been quite close, were now open. From these facts it followed, as a necessary consequence, that in winter the arch contracting descended, and the spandril joints opened, and in summer the arch expanding rose and closed these joints, and opened those at the crowns. Thus the joints of the parapets, which were made of single slabs of granite for the whole height, became good indicators of the changes of temperature. It had also been observed, in the Waterloo and other bridges, that joints made good in the winter with Roman cement were found crushed in the summer.

With the view of obtaining some data for calculation, Mr. Rennie procured samples of granite, sandstone, and slate, and placing them in a properly constructed oven, ascertained the rates of their expansion, which are given in the paper.

A series of experiments was made at the request of the late Mr. Rennie by Mr. S. Walker, of Rotherham, on the variations in the length of 231½ feet of the frieze, bolted together and laid on a firm platform. The temperature of the atmosphere and of the plates and the length were noted at five o'clock in the morning and at three o'clock in the afternoon, and in some of the experiments at seven o'clock in the evening. The details of these experiments are given in the paper.

The paper is accompanied by calculations for the rise of an arch and the opening at the spandrils for an increased temperature, and also by tables of the expansibility of different kinds of stones and irons given by Distingy.

"Specification and Working Drawings of the Middlesborough-on-Tees Gas Works."

By Peter Henderson, Assoc. Inst. C. E.

In this communication, the author details the several works, erections, and fittings of the Gas Works at Middlesborough-on-Tees, and the mode in which they are to be executed and completed.

"On a mode of Dowelling Timber, or of combining it and other materials for general purposes."

By M. J. Brunel, M. Inst. C. E.

The author proposes to unite timber by means of iron dowels and asphalte. Mastic had been used in the Tunnel works for the purpose of fitting small plates of cast-iron to the poling boards. These, though constantly immersed in water and mud, and subject to severe hammering, had stood perfectly well. Asphalte is now used* in preference to mastic, as it sets immediately. The author conceives that stone may be united by a similar kind of dowelling; and that wood may be interposed between stone and iron, so as to be used to advantage with the stone blocks, for the chairs of railways. Also, that this method may be used with great advantage in ship-building, in mast-making, and wherever any species of dowelling is required.

List of Patents

Granted for Scotland subsequent to 22d March, 1840.

To Sir William Burnett, of Somerset House, for improvements in preserving animal, vegetable, woollen, and other fibrous substances.—Sealed March 25th.

Peter Lomax, of Little Bolton, Weaver, for certain improvements in looms for weaving.—Sealed March 26th.

Peter Bancroft, of Liverpool, and John Mac Innes, of the same place, for an improved method of renovating or restoring animal charcoal, after it has been used in certain processes or manufactures, to which charcoal is now generally applied, and thereby recovering the properties of such animal charcoal and rendering it again fit for similar uses.—Sealed April 6th.

William Hunt, of Portugal Hotel, Fleet-street, London, Manufacturing Chemist, for improvements in the manufacture of potash and soda, and their carbonates.—Sealed April 11th.

Thomas Robinson Williams, of Cheapside, London, for certain improvements in the manufacture of woollen and other fabric or fabrics, of which wool or fur form a principal component part, and in the machinery employed for effecting that object.—Sealed April 11th.

Henry Philip Rouquete, of Norfolk-street, Strand, (communicated by a foreigner, residing abroad,) for a new pigment.—Sealed April 20th.

William Stone, of Winsley, for improvements in the manufacture of wire.—Sealed April 20th.

Pierre Auguste Ducote, of 70, St. Martin's-lane, in the county of Middlesex, for certain improvements in printing china, porcelain, earthenware, and other like wares, and for printing on paper, calicoes, silks, woollens, oil cloths, leather, and other fabrics, and for an improved material to be used in printing.—Sealed April 20th.

John Jackson, of Ryder-street, St. James's, London, for improvements in apparatus for consuming gas, for the purpose of light, communicated by a foreigner, residing abroad.—Sealed April 20th.

Jean François Victor Fabien, of King William street, London, (a communication from abroad,) for improvements in rotary engines, to be worked by steam or other fluids.—Sealed April 21st.

Thomas Aitken, of Chadderton, manufacturer, for certain improvements in the machinery or apparatus for drawing cotton and other fibrous substances.—Sealed April 22nd.

Matthew Uzielli, of King William street, London, (communicated from abroad,) for certain improvements in the arrangement and construction of ships' hearths, or apparatus for cooking and for obtaining distilled or pure water from salt or impure water.—Sealed April 22nd.

List of Patents

SEALED IN ENGLAND.

1840.

To Claude Joseph Edmée Chaudron Junot, of Brewer-street, Golden-square, operative chemist, for certain improved processes for purifying, and also for solidyfying tallows, grease, oils, and oleaginous substances.—Sealed 30th March—6 months for inrolment.

Henry Martin, of Morton-terrace, Camden-town, for improvements in preparing surfaces of paper.—Sealed 30th March—6 months for inrolment.

William Neal Clay, of Flimby, Cumberland, gentleman, for improvements in the manufacture of irón.—Sealed 31st March—6 months for inrolment.

John Leberecht Steinhaueser, of Upper Islington-terrace, gentleman, for improvements in spinning and doubling wool, cotton, silk, and other fibrous materials,—being a communication.—Sealed 31st March—6 months for inrolment.

Peter Bancroft, of Liverpool, merchant, and John Mc Innes, of the same place, manufacturing chemist, for an improved method of renovating or restoring animal charcoal, after it has been used in certain processes or manufactures to which charcoal is now generally applied, and thereby recovering the properties of such animal charcoal, and rendering it again fit for similar uses.—Sealed 31st March—6 months for inrolment.

Charles Cummins, of Leadenhall-street, chronometer-maker, for certain improvements in barometers and sympiesometers.—Sealed 2nd April—6 months for inrolment.

James Stead Crosland, of Leeds, engineer, for certain improvements applicable to locomotive and other steam engines.—Sealed 2nd April—6 months for inrolment.

Thomas Smedley, of Holywell, North Wales, gentleman, for improvements in the manufacture of tubes, pipes, and cylinders.—Sealed 4th April—6 months for inrolment.

Harrison Blair, of Kearsley, manufacturing chemist, and Henry Hough Watson, of Little Bolton, chemist, for an improvement or improvements in the manufacture of sulphuric acid, crystallized soda, and soda ash, and the recovery of a residuum or residuums, applicable to various useful purposes.—Sealed 6th April—6 months for inrolment.

Richard Beard, of Egremont-place, New-road, gentleman, for improvements in printing calicoes and other fabrics,—being a communication.—Sealed 6th April—6 months for inrolment.

Edward Thomas Bainbridge, of Park-place, St. James's, gentleman, for improvements in obtaining power.—Sealed 13th April—6 months for inrolment.

Thomas Young, of Queen-street, merchant, for improvements in lamps.—Sealed 13th April—6 months for inrolment.

James Caldwell, of Mill-place, Commercial-road, engineer, for improvements in cranes, windlasses, and capstans.—Sealed 15th April—6 months for inrolment.

John Gold, of Etna Glass Works, Birmingham, glass manufacturer, for improvements in the manufacture of decanters and other articles of glass.—Sealed 15th April—6 months for inrolment.

William Potts, of Birmingham, brass-founder, for certain

apparatus for suspending pictures and curtains.—Sealed 15th April—6 months for inrolment.

Louis Auguste de St. Sylvain, Baron de Los Valles, of Nottingham-street, Marylebone, for certain improvements in cleansing, decorticating, purifying, and preserving corn, and other grain,—being a communication.—Sealed 15th April—6 months for inrolment.

William Grimman, of Camden-street, Islington, modeller, for a new mode of wood paving.—Sealed 15th April—6 months for inrolment.

Thomas Robinson Williams, of Cheapside, gentleman, for certain improvements in obtaining power from steam, and elastic vapours or fluids, and for the means employed in generating such vapours or fluids; and also for using these improvements in conjunction with distillation or evaporation, and other useful purposes.—Sealed 15th April—6 months for inrolment.

Joseph Whitworth, of Manchester, engineer, for certain improvements in machinery or apparatus for cleaning and repairing roads or ways, and which machinery is also applicable to other purposes.—Sealed 15th April—6 months for inrolment.

William Unsworth, of Derby, silk lace manufacturer, for an improved tag for laces.—Sealed 16th April—6 months for inrolment.

Samuel Wilkes, of Darleston, iron-founder, for improvements in the manufacture of vices.—Sealed 16th April—6 months for inrolment.

William Henry Bailey Webster, of Ipswich, surgeon, R. N., for improvements in preparing skins and other animal matters for the purposes of tanning; and the manufacture of gelatine.—Sealed 16th April—6 months for inrolment.

Samuel Marlow Banks, of Bilston, Stafford, gentleman, for improvements in the manufacture of iron.—Sealed 16th April—6 months for inrolment.

Robert Cooper, of Petworth, near Evesham, Gloucester, gentleman, for improvements in ploughs.—Sealed 16th April—6 months for inrolment.

Francis Molineux, of Walbrook-buildings, gentleman, for improvements in the manufacture of candles, and in the means of consuming tallow and other substances for the purposes of light.—Sealed 23rd April—6 months for inrolment.

Elijah Galloway, of Manchester-street, Gray's Inn road, engineer, for improvements in steam engines; which are also applicable to engines for raising and forcing fluids.—Sealed 23rd April—6 months for inrolment.

Jonathan Sparke, of Langley Mills, Northumberland, agent, for certain improved processes or operations for smelting lead ores.—Sealed 23rd April—6 months for inrolment.

John White, of Manchester, engineer, for certain improvements in vices.—Sealed 23rd April—6 months for inrolment.

James Malcolm Rymer, of Henrietta-street, civil engineer, for certain improvements in castors for furniture, such improved castors being applicable to other purposes.—Sealed 23rd April—6 months for inrolment.

CELESTIAL PHENOMENA, FOR MAY, 1840.

D.	H.	M.	
1			Clock after the sun, 3m. 5s.
	—		☽ rises 3h. 50m. M.
	—		☽ passes mer. 11h. 22m. M.
	—		☽ sets 7h. 16m. A.
	14	28	♃'s second satt. will im.
	15	43	♂ in conj. with the ☽ diff. of dec. 5. 5. S.
2		6	Ecliptic conj. or ● new moon
	8		☽ in Perigee.
3	20	43	♃ in oppo. to the sun
4	3		♂ in conj. with the sun
5			Pallas stationary
	—		Clock after the sun, 3m. 30s.
	—		☽ rises 6h. 28m. M.
	—		☽ passes mer. 3h. 35m. M.
	—		☽ sets Morn.
	7	10	☿ greatest elong. 26. 18. W.
7	13	4	♃'s first satt. will em.
8	2	50	☽ in □ or first quarter.
			Occul ψ in Leonis im. 8h. 22m. em. 9h. 30m.
9			♃'s third satt. will em.
10			Clock after the sun, 3m. 49s.
	—		☽ rises 1h. 17m. A.
	—		☽ passes mer. 7h. 55m. A.
	—		☽ sets 2h. 5m. M.
	—		Occul r in Leonis im 12h. 0m. em. 13h. 4m.
11	11	7	♂ in the ascending node.
12	8	38	♃'s second satt. will em.
14			Mercury R. A. 1h. 57m. dec. 8. 22. N.
	—		Venus R.A. 2h.10m. dec. 11.38.N
	—		Mars R.A. 3h. 15m. dec. 18.7. N.
	—		Vesta R. A. 15h. 55m. dec. 10. 28. S.
	—		Juno R. A. 5h. 44m. dec. 14. 33. N.
	—		Pallas R. A. 19h. 14m. dec. 19 32. N.
	—		Ceres R. A. 20h. 19m. dec. 24. 38. S.
	—		Jupiter R. A. 14h. 42m. dec. 14. 24. S.
	—		Saturn R. A. 17h. 18m. dec. 21. 33. S.
	—		Georg. R. A. 23h. 23m. dec. 4. 46. S.
	—		Mercury passes mer. 22h. 24m.
	—		Venus passes mer. 22h. 42m.
	—		Mars passes mer. 23h. 45m.
	—		Jupiter passes mer. 11h. 11m.
	—		Saturn passes mer. 13h. 46m.
	—		Georg. passes mer. 19h. 51m.
15			Clock after the sun, 3m. 54s.
	—		☽ rises 7h. 23m. A.
	—		☽ passes mer. 11h. 28m. A.
	—		☽ sets 3h. 5m. M.
15	1	3	♃ in conj. with the ☽ diff. of dec. 6. 20. N.
16	9	27	♃'s first satt. will em.
	11	30	Ecliptic oppo. or ○ full moon
	—		Occul π in Scorpii. im. 8h. 6m. em. 8h. 52m.
17	1		♀ greatest Hel. Lat. S.
	6		☽ in Apogee.
18	1	42	♄ in conj. with the ☽ diff. of dec. 6. 19. N.
	12	46	Vesta in oppo to the sun, intens. of light 1·677
19	11	13	♃'s second satt. will em.
20			Clock after the sun, 3m. 46s.
	—		☽ rises, Morn
	—		☽ passes mer, 2h. 48m. M.
	—		☽ sets 6h. 13m. M.
21			Occul γ Capri. im. 11h. 53m. em. 12h. 56m.
23			♃'s first satt. will em.
24	1	24	☽ in □ or last quarter
	—		Occul 78 Aquarii im. 12h. 34m. em 13h. 35m.
25			Clock after the sun, 3m. 23s.
	—		☽ rises 1h. 13m. M.
	—		☽ passes mer. 6h. 43m. M.
	—		☽ sets 0h. 29m. A.
	9	45	Her: in conj. with the ☽ diff of dec. 3. 29. S.
26	13	48	♃'s second satt. will em.
27	0	58	☿ in conj. with ♀ diff. of dec. 0. 29. S.
28			Ceres stationary
29	20	25	♀ in conj. with the ☽ diff. of dec. 6. 11. S.
	23	33	☿ in conj. with the ☽ diff of dec. 6. 15. S.
30			Clock after the sun, 2m. 47s.
	—		☽ rises 2h. 35m. M.
	—		☽ passes mer. 11h. 1m. M.
	—		☽ sets 7h. 45m. A.
	10	3	♂ in conj. with the ☽ diff. of dec. 4. 54. S.
	19		☽ in Perigee
31	7	15	Ecliptic conj. or ● new moon

J. LEWTHWAITE, Rotherhithe.

THE

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CONJOINED SERIES.

No. CI.

Recent Patents.

To Charles Pierre Devaux, *of Fenchurch-street, in the city of London, merchant, for a new or improved apparatus for preventing the explosion of boilers or generators of steam,—being a communication from a foreigner, residing abroad.*—[Sealed 23rd May, 1837.]

The explosions of boilers or generators of steam arise sometimes from the steam simply accumulating gradually in the boiler or generator, until it has acquired an elastic force, exceeding in intensity the force of resistance of the metal of the boiler or generator; and more frequently from the level of the water in the boiler or generator being suffered to get low enough to allow the sides of the boiler or generator to become heated to a very high temperature, whereby when a fresh supply of water is introduced into the boiler or generator, and comes suddenly in contact

with the overheated sides thereof, the sudden formation of a great volume of steam takes place; and this overheating of the boiler takes place sometimes in marine boilers, from the vessel lying over for a considerable time on either side, by which the opposite side of the boiler is left unprotected by water; and sometimes explosions arise from the sudden opening of a valve, or any other aperture in a boiler, whereby in consequence of the sudden diminution of the pressure upon the surface of the water, a violent ebullition of the water is produced, dashing it about in the boiler, as well as all over the space occupied by the steam, as against the top and sides of the boiler; and then, if the level of the water has been suffered to get low enough for the sides of the boiler to have become overheated, or if by accident any parts of the boiler have become so overheated as to surcharge the steam with caloric, then the water coming suddenly in contact with the said overheated surfaces of the boiler, or into the midst of the steam surcharged with caloric as aforesaid, will be converted suddenly into a great volume of steam; and sometimes such explosions may take place in consequence of the formation of saline or earthy, or calcareous incrustations, or deposits upon the bottom of a boiler or generator; for such incrustations or deposits, being bad conductors of heat, may allow the bottom plates of the boiler or generator to acquire a very intense heat without the same being immediately or regularly transmitted to the water, until at length the heat becomes sufficient to break up or disturb the said incrustations or deposits; and then the water coming in sudden contact with the overheated plates, a sudden generation of a great volume of steam will take place. It also sometimes happens that caloric accumulates in the water contained in the boiler or generator, instead of converting the same regularly into steam; and when the

water becomes thus charged with caloric beyond a given point, the caloric suddenly disengages itself, and a very great volume of steam is generated. Now the object of this improved apparatus is to preserve boilers or generators of steam from the effects of the aforesaid causes of explosion, and it consists of the following parts:—

The first apparatus, intended to obviate the danger of explosion arising from a simple gradual accumulation of steam in a boiler or generator, is a compound safety valve, composed of a valve of the ordinary construction, (loaded by means of a weight hung on the end of a lever,) combined with a loaded plunger or piston, working in a cylinder filled with oil or other fluid, into which cylinder steam is admitted from the boiler or generator to press on the surface of such oil or fluid, and raise the plunger or piston whenever the first or ordinary safety valve does not act freely and correctly, so as to lift up such first safety valve, and ensure the escape of the superabundant steam, the said first safety valve being capable of acting independently of the said piston or plunger, so long as it is in proper order.

And another part of the invention is intended to prevent the danger of explosion arising either from the presence of steam too highly elastic in the steam space of the boiler, (whether the same proceed from a gradual accumulation or from any sudden generation of steam,) or from the heating of the bottom of the boiler by reason of incrustations or deposits; and this part of the apparatus consists of a combination of pipes, steam boxes, cocks, and other parts, in which a piece of fusible metal is applied, adapted to melt at a given temperature; and such fusible metal is applied either to be acted upon by the heat of the steam in the upper part of the boiler, or by the heat of the bottom of the boiler, according as the object of this part of the apparatus

is to prevent explosions arising from a sudden or other formation of too highly elastic steam in the steam space; and the effect of the melting of the fusible metal is to open an exit passage for the steam contained in the boiler, which exit can be checked at pleasure, so as to allow the melted fusible metal to be replaced by another piece of such metal without interrupting the working of the engine, as I will hereinafter more minutely describe.

And another part of the invention is an improved float apparatus, adapted not only to indicate the level of the water in the boiler or generator, but to allow the escape of steam when that level sinks too low.

And lastly, an improved apparatus, which is more particularly applicable to steam-boat boilers, and consists of dampers adapted to operate by their own gravity or by the gravity of other heavy bodies, whenever a steam-boat lies over on one side for any length of time, so as to close partially or wholly the passage through the flues or chimney, as I will hereafter describe more minutely.

And note:—The steam allowed to escape from the boiler or generator, by the operation of any part of the aforesaid apparatus, is carried in the manner hereinafter more minutely described, either into the flues which surround the boiler or generator, in a direction opposite to that of the draught of the furnace, for the purpose of driving the hot air and flame back towards the furnace, so as to wholly or partially destroy the effect of the fire, or such waste or superabundant steam may be carried direct into or under the furnace, partially or wholly to extinguish the fire, or it may be employed in other modes, as I will hereinafter mention, for the purpose of giving notice of danger to the persons having charge of the engine; or it may be allowed to escape into the atmosphere, and all the parts of the said new or improved apparatus may be com-

bined in the same boiler, or they may be used separately according to circumstances.

Figs. A, B, and C, Plate X., represent a steam boiler, to which the greatest part of the improvements are applied; the other figures represent the different parts of the said apparatus in detail. Figs. 1 to 6, represent that part of the apparatus which consists of a compound safety valve or safety apparatus. Fig. 1, is a side view thereof, seen in a box or case, in which the same is to be placed and locked up; (the case is shewn in section.) Fig. 2, is a vertical section of the compound safety valve, taken through the centre line 3, 4, of the plan fig. 3; fig. 4, is a cross section of part of the compound safety valve; and figs. 5, and 6, are detached views of parts of the same. *a*, to *h*, figs. 1, and 2, are parts nearly similar and corresponding in operation to the parts of the ordinary loaded safety valve; that is to say, *a*, is a cylindrical pipe communicating with the interior of the boiler. At the upper end of the pipe *a*, is the seat for the valve *b*, the stem of which passes freely through a cup in the upper part of the valve box *d*, and the said valve is loaded by means of a weight *e*, fixed near the extremity of a long lever *f*. If the outer end of the lever *f*, be pressed down, it will press the valve *b*, down in its seat; but if the lever be lifted up, the valve will be also lifted up. The lever *f*, is guided in a grooved bracket *i*, (see figs. 1, and 2.) The extreme end of the lever *f*, has a fork formed on it, and is connected to a rod *l*, the lower end of which is cased in a tube of hard steel or glass fitted tightly on the said rod, so as to form a plunger or piston, which works through a collar of leather in a cylinder *m*, being pressed down to the bottom thereof, when the apparatus is at rest, by a weight *v*. The cylinder *m*, communicates by a horizontal passage with a smaller cylinder *n*, (see figs. 3, and 4.) Both of these cylinders

are filled with oil or other fluid, and the smaller cylinder *n*, communicates by a pipe *o*, with the tube beneath the valve *b*, (see fig. 2.)

If the steam in the boiler rises at all above the pressure, which the valve is capable of sustaining, it will lift up the valve *b*, and passing by its edges into the valve box *d*, will escape through the pipe *g*, which leads it away into the atmosphere, or into the flues or furnaces.—But if, as is often the case with safety valves, the valve *b*, should, either from oxidation or from the external pressure of the atmosphere, or from any other cause, stick in its seat, and not rise readily, then the steam continuing to accumulate in the boiler, and which fills the pipe *o*, and is in contact with the surface of the oil contained in the cylinder *n*, will exert its pressure thereon, and thus cause the plunger or piston *b*, to rise.—When the said plunger has risen a little way, the bottoms of the openings of the links *k*, will catch against the pins of the fork at the end of the lever *f*, and lifting up the end of that lever, will thereby lift up the valve *b*, out of its seat; and it is to be observed, that the piston *l*, acts with a greater force to lift the valve *b*, than is due merely to the increased pressure of the steam, because it acts with a very long leverage on such valve. The valve *b*, therefore, will thus be compelled to rise before the steam has acquired a dangerous intensity of elastic force. As soon as the valve *b*, quits its seat, steam will get by the edges of the said valve, and consequently, the pressure on the surface of the oil in the cylinder *n*, will immediately begin to diminish, and as more and more steam escapes through the valve *b*, the pressure on the surface of the said oil, tending to force up the piston *l*, will more diminish, so that the piston or plunger will gradually descend, and cease to operate upon the valve *b*.

It will be now easily understood, that the effect of this

combination of parts is not only to cause the valve *b*, to be forcibly lifted as aforesaid, whenever it does not yield to the direct pressure of the steam; but to regulate its motion, and prevent it from jumping up suddenly, and then suddenly falling, as is often the case with ordinary safety valves; because the valve *b*, cannot rise much unless the steam is strong enough to act upon tbe plunger *l*, and the motion of that piston will not diminish instantaneously, but must have time, whereby the changes of motion of the valve *b*, will be compelled to be gradually effected.

The whole apparatus is contained, as already mentioned, in a box A, which will be furnished with a proper door, and a lock and key, and the said box should be kept locked, and the key kept by the person having charge of the engine in chief, so as to prevent any tampering by the workmen with the load of either the first valve or of the piston *l*. The box A, may stand over any suitable part of the boiler detached therefrom, as at A, in figs. A, and B.

As to that part of the said new or improved apparatus, the operation of which depends upon the melting of a piece of fusible metal, such fusible metal may be applied either at or near the bottom of the boiler, to receive heat from the mass of heated water, and from the metal of the bottom of the boiler, and from steam brought into contact with the said plug of fusible metal; or such fusible metal may be applied at the upper part of the boiler, so as to be acted upon only by the heat of the steam itself in such upper part; or otherwise it may be applied so as to be acted upon through conductors of heat, which I will hereafter describe, to allow an escape of steam, either whenever the level of the water has sunk too near the bottom of the boiler, or whenever the bottom of the boiler is acquiring too high a temperature.

Figs. 7 to 14, represent the first mode of applying the

fusible metal; figs. 15 to 18, represent the second; and figs. 19 to 24, represent the third mode of applying it.

Fig. 7, is a vertical section; fig. 8, is a side view; fig. 9, a plan; and fig. 10, a horizontal section, taken at the line 1, 2, fig. 7; fig. 11, is a vertical section, taken at the line 3, 4, fig. 8; fig. 13, is a horizontal section, taken through the line 5, 6, fig. 7; fig. 14, is a plan of the cover *p*.

a, a, b, b, represent the top and bottom plates of a boiler; *c,* is a box firmly fixed to the bottom plate of such boiler. From the box *c,* two pipes *d,* and *e,* rise, which are fitted with steam-tight joints to the box *c,* and the top plate of the boiler, (see figs. 7, and 8.)

In the pipe *d,* is placed another pipe *f,* fitted into the top part of the pipe *d,* with a screw joint, (see the upper part of fig. 7.) The upper end of the pipe *f,* has an open communication with a steam box *g,* from which a pipe *h,* leads into the flue of the furnace, (see figs. A, B, and C, before mentioned.)

The box *g,* is closed by a cover *p,* fastened on it steam tight. Standards *q,* rise from the box *g,* (see fig. 12,) and a horizontal rod *x,* passes through them, and through the square at the top of the cover, (see also fig. 12.) On one end of the rod *x,* a padlock *f,* is fastened, which being locked, the rod *x,* cannot be drawn out, and consequently the cover *p,* cannot be removed.

The tube *e,* communicates through a small tube *i,* in which a stop cock is fitted at *l,* to a bent tube *m,* which turns down through the top plate of the boiler, and has fitted over its end a cap *n,* pierced with small holes.

When the apparatus is set for working, the stop cock is set and kept open, as shewn in fig. 7, to allow steam to pass from the boiler into the tube *e.*

The lower end of the pipe *f,* is slightly conical, and into the conical part is fitted a small plug of fusible metal,

which may be composed of lead, tin, and bismuth. Over the lower end of the pipe *f*, is screwed a small cover or box, with a central stem to support the plug of fusible metal, and small holes are pierced in the sides of the said cover to allow steam to pass into it from the pipe *e*, and to come in contact with the plug.

The operation and effect of this apparatus are as follow:—When the boiler is in operation, the box *c*, resting, as aforesaid, on the bottom of the boiler, and being surrounded by the liquid mass of water, will gradually acquire the same temperature as the water which surrounds it; and that temperature will, by degrees, be transmitted to the plug of fusible metal.

While steam is being generated, a portion of such steam, entering through the cover *n*, of the pipe *m*, will pass along that pipe, and will flow through the pipe *e*, and enter the box *c*. The steam, meeting with no aperture for its escape, and consequently being motionless, will rise to the same temperature as the metallic surfaces which contain it, which are themselves at the same temperature as the surrounding water and the bottom of the boiler. The under part of the fusible plug will thus be in contact with steam, the heat of which tends, in conjunction with that of the metallic surface of the lower plate of the boiler of the box *c*, and pipes *d*, and *f*, to melt it.

As long as the heat of the steam keeps within the prescribed limits, or as long as the liquid mass of water does not reach a temperature exceeding that at which the fusible plug is calculated to melt, things will remain in this condition of rest. But if there should be produced an excess of heat, whether by reason of incrustations, or deposits, or by any other cause; then such heat will melt away the bottom and part of the sides of the fusible plug; which,

therefore, no longer fitting tight in its seat, will be blown by the steam up through the pipe *f*, into the steam chamber *g*, and the superabundant steam, rushing up that pipe into the said steam chamber, will be thence conveyed through the pipe *h*, into the flue surrounding the boiler, in a direction contrary to that of the draught coming from the furnace. The fire will thus be damped in its action in proportion to the length of time during which the discharge of steam is continued, and thus the boiler, instead of getting more heated, will, on the contrary, become progressively cooler in its whole extent. When the fusible plug has melted, the escape of steam may be stopped, as soon as deemed necessary, with stopping the engine.

Figs. 15, 16, 17, and 18, represent an apparatus, in which a fusible metal plug, applied at the upper part of a boiler, is acted upon only by the heat of the steam itself. Fig. 15, is a transverse section; fig. 16, a side view; fig. 17, a horizontal section, taken at the line A, fig. 15; and fig. 18, is a plan of fig. 16.

a, a, is the upper plate of the boiler; *b*, is a short tube, firmly bolted to the boiler, the lower part of which tube is inside of the boiler, and serves as the seat of a cock, while the upper end of the said tube *b*, which is of larger diameter, forms a steam chamber; *c*, is the conical plug of the cock, ground into the seat; *b*, the large end of the conical plug; *c*, is the lower end thereof, in order that the pressure of the steam may tend to make the said plug fit tight in its seat.

The passage of the cock opens horizontally into a box *d*, which is perforated with holes; and a vertical cylindrical hole is bored out of the plug of the cock itself, in which is inserted the short upright pipe *f*, which corresponds to the pipe *f*, of the apparatus before described. In the lower

end of this pipe is fixed the fusible metal plug. A cover *p*, is placed over the chamber *b*, and is fastened down tight thereon.

The effect and operation of this apparatus are as follow:—Whenever the body of steam, contained in the boiler, rises to a temperature and pressure exceeding that for which the boiler is calculated, the different metal surfaces of the apparatus contained within the boiler, will gradually acquire the same temperature; and the heat of the said surfaces, together with that of the steam which enters through the passages *y*, and comes in contact with the plug of fusible metal, gradually meet the same at the under side and edges, and then the steam will blow the plug up through the pipe *f*, into the steam chamber *b*, and by that means a passage being cleared for the steam, it will rush through the said pipe *f*, into the steam chamber above the perforated plate, and down through the holes in the said plate, filling the steam chamber *b*, and thence passing into the pipe *h*, which may lead it away into the atmosphere, or into the flue surrounding the boiler, to meet and check the draft of the furnace in the manner already described.

Figs. 19 and 20, represent an apparatus, with a fusible metal plug, intended to allow the escape of steam to check or altogether destroy the effect of the fire, whenever the level of the water sinks too near the bottom of the boiler; and this apparatus is intended more particularly for boilers containing a very little depth of water over the bottom part of the boiler exposed to heat. *e*, is the bottom plate of a boiler or generator; *f*, is the lower end of a tube, screwed into an inverted cup *g*, which is screwed or rivetted fast, and water-tight, on the bottom plate of the boiler through which the lower end of the said tube passes.

Just above the contracted part of the tube *f*, (see fig. 19,)

a plug of fusible metal is fixed into a conical seat in the said tube *f*. The upper end of the tube *f*, is connected by a screw-joint, with a pipe *h*, descending through the top plate of the boiler from a nozzle or box, out of the upper part of which a passage *i*, proceeds horizontally, and then turns down at *l*, into the boiler. In the pipe or passage *l*, a cock *m*, is placed for opening and shutting, at will, the communication between the passages *h*, *i*, and *l*; *n*, is a lever or handle for turning the cock *m*. The handle *n*, is secured in its position, (shewn in fig. 19,) when the cock *m*, is open, by a bolt or rod *o*, passing through the arms of a standard *p*, in such a manner that it cannot be drawn out without the padlock *q*, being previously unlocked. The upper end of the tube *h*, is closed by a screw plug *r*; and note,—that a claw, formed on the lever *n*, catches over the top of the plug *r*, (as shewn at *x*, fig. 19,) so that the plug cannot be opened without unlocking the padlock *q*.

If the body of water in the boiler acquires too intense a heat, or if the water sinks below the level of the top of the cup *g*, the heat of the water, in the first case, will be quickly communicated to the metallic surfaces around the plug of fusible metal; and in the second case, the heat of the furnace will be quickly communicated directly to the said lower end of the tube *f*; and thus in either case, such heat will be quickly communicated to the plug of fusible metal, so as to melt the same, and cause it to drop down into the furnace, leaving an open passage through the tube *f*; thus the steam, proceeding from the boiler, will be allowed to issue into the furnace, and damp or even extinguish the fire.

In fig. 21, the pipe is shewn fixed into the bottom of the boiler itself, and projecting through it, so that the plug of fusible metal will be affected by the heat, and melt even before the bottom of the boiler or the body of water

therein, have acquired that sufficient temperature at which the said fusible plug would melt.

Figs. 22, 23, and 24, shew another mode of applying fusible metal, for the purpose of preventing the explosions. *f*, is the tube containing the fusible metal, the lower end of which tube being enlarged, and projecting down through the box *g*, to form a conductor of heat.

A rod *h*, rests on the fusible metal, and round the upper end of such rod *h*, a spiral spring *i*, is coiled, fastened to the head of the said rod; the lower end of the spiral spring *i*, resting upon the nut, which screws the tube *f*, to the boiler plate. To the head of the rod *h*, is connected by a joint pin, an upright stem *l*, with a bevil edge at its upper end, on or against which, applies the corresponding bevil edge of a horizontal lever *m*, mounted on a fixed centre pin at *n*, in the standard *o*. The weight *p*, keeps the end of the lever *m*, down upon the end of the upright stem *l*, and tends to compress the spring *i*.

Now when the heat of the conductor or box *g*, or of both, have attained that degree at which the fusible metal will melt, and the same begins to melt, the rod *h*, being no longer supported, will yield to the pressure of the weight *p*, and descend, the end of the lever *m*, pushing the end of the rod *l*, away from it, while the end of the said lever *m*, falls down in an arc of a circle, and gets by the end of the upright stem *l*, which quits the retaining catch *r*; the opposite end of the lever *m*, will thus be raised, and may raise a valve or a cock to let out steam from the boiler; at the same time that the end of the lever *m*, drops down past the end of the stem *l*, the spring *i*, being no longer compressed by the weight *p*, will fly up, and thus withdraw the lower end of the rod *h*, from the fusible metal, before the same has hardened again.

In fig. 24, the fusible metal is shewn in a tube *f*, de-

scending through the bottom of the boiler, for the same purpose as is mentioned in speaking of fig. 21.

In figs. 25, 26, 27, 28, 29, and 30, I have represented two modes of constructing that part of the apparatus, which consists of an improved float apparatus.

In fig. 25, *d*, is a box of cast-iron or gun metal, fixed to the top of the boiler. The lower part of this box has a conical cavity in it, and the boiler has, in this place, an aperture equal to the base of the cone, (see fig. 25.) At the top of the said conical cavity, a small aperture is made, communicating between the said cavity and the chamber *g*. The chamber *g*, is connected by a pipe *h*, and another conducting pipe, not shewn in the drawing, to the flues which surround the boiler; *i*, is a vertical rod of gun metal, the upper end of which is hemispherical;—it is ground to fit accurately to the apex of the conical cavity, (see fig. 25,) so as to prevent steam from passing from the boiler into the chamber *g*, so long as the rod *i*, is kept in contact with the upper end or apex of the conical cavity. The lower part of the vertical rod *i*, has a shoulder formed on it, below which a screw is cut for the nut *l*, to screw on.

The object of the rod 1, is to allow the stoker to ascertain whether the float operates properly or not; for if the upper part of the rod 1, be depressed, it acts on the rod *i*, lowers it, and allows steam to escape.

J, is a lever, one end of which carries a float or hollow ball L, (see fig. A,) the other end being mounted in bearings K, K.

The rod *i*, passes through the lever J, (see fig. 25,) the hole through which it passes being large enough to allow of play in the joint; and the lever J, is prevented from decending below a certain point by a guide or stop *r*.

When the boiler is being filled with water to its usual level, the floater, which is fastened at the end of the lever J, is pushed up by the water as its level rises.

By this effect of the float rising at the end of the long lever J, the rod *i*, is pressed against the aperture in the bottom of the steam chamber *g*, so as to close that aperture.

If the quantity of water delivered into the boiler from the feeding pipe becomes less than that which is converted into steam, the level of the water, by sinking progressively, would soon reach the level of the upper part of the flues, and thus expose the side of the boiler, unprotected, to the heat of the flame and hot air in the flues. This, however, will be prevented by the action of the float L, which, sinking down gradually with the water, will draw down the rod *i*, and the steam will escape from the boiler through the little aperture in the conical chamber, and will pass into the steam chamber *g*, and thence through the pipe *h*, away to the flues to check the draught, or else into or under the furnace, or else into the atmosphere.

In figs. 27, 28, 29, and 30, the second mode of constructing the so improved float apparatus is shewn. *a*, is the upper part of a boiler; *b*, is a tube, screwed through the upper plate of the boiler; at the upper part a steam chamber *c*, is formed, and is closed by a steam cap *e*,—out of the chamber a horizontal pipe *h*, leads. The lower end of the tube *b*, is formed of a hemispherical shape. A small horizontal pipe *f*, leads out of the tube *b*, below the steam chamber *c*; and in the bottom of the chamber *c*, is a conical seat, into which is ground a valve, consisting of a small tube *g*, in which is placed a spiral spring, kept pressed down by a stud, projecting down from the cap *e*. The lever J, differs from the same lever in the preceding description, only in having a hemispherical plug or valve *x*, of lead or tin, to apply against the aperture of the tube *b*. The plug or valve is soldered into the head of a screw-bolt *y*, which is secured by a nut,—see fig. 27.

The plug or valve *x*, applying as aforesaid against the

mouth of the pipe *b*, forms, as it were, a self-adjusting fitting therewith,—for the force with which the float L, is raised, by reason of its buoyancy, will cause the soft metal of the plug or valve to be slightly indented by the sharp edges of the tube *b*, and thus a perfect contact will be effected.

A tube *m*, is soldered to the float L, (see fig. 27 and A;) this tube is open at its upper end, and communicates to the float L, at the other end, to admit freely the steam and air to pass through the pipe *m*, into the float, for the purpose of preventing the said float from having its sides crushed in by the external pressure of the steam upon it, or from bursting by the expansion of the air within it, produced by the heat of the steam.

In figs. 33 to 36, I have represented one mode of constructing that part of the said apparatus which consists of dampers, applied in the flue of steam boilers, to act by the motion of the boat, inclining the boiler to one side or the other. Fig. 33, is a cross section of a boiler and furnace, with the said dampers; fig. 34, is a side view of one end thereof; fig. 35, shews the dampers viewed edgewise, in cases formed for them to work in; and fig. 36, shews one of the dampers detached, viewed edgewise. C, C, are the side flues; E, is a cast-iron case, let into each side of the flue to receive one of the dampers; F, is a door closing such case; G, G, are the dampers, hanging freely from pivots or centre pins H, let into the cases E.

While the vessel remains level, the dampers will, by their gravity, maintain a vertical position; but, immediately that the steam vessel lies over on its side, one of the dampers will rest against the side of the boiler, and prevent the fire from over heating the same.

I have hereinbefore stated that all the parts of the apparatus may be applied in combination or separately. It

must, of course, be a matter of discretion with the engineer, fitting-up a steam boiler, when to do the one and when the other. The part last described is, as I have stated, only applicable properly to steam-boat boilers, such boilers only being exposed to the danger arising from their being inclined over to one side, so as to make the level of the water sink on the opposite side. The apparatus described, in reference to figs. 7 to 14, will probably be found necessary chiefly, if not only, where the water forms a deposit or incrustation in the bottom of the boiler; and for stationary boilers, working under favourable circumstances, only the compound safety valve, the float apparatus, and the apparatus figs. 15 to 18, may be required. As to the proportions and arrangements of the various parts of the metal of which the same are to be composed, the selection thereof must be matter of discretion for the engineer constructing the apparatus.

I will, however, also observe, that in respect to all the apparatus acting by means of fusible metal, the apertures through which the steam is allowed to escape, are to be made of such size as not to allow the steam to escape suddenly in great quantities.

Having now described the nature of the said invention of a new or improved apparatus for preventing the explosions of boilers or generators of steam, I hereby declare that in respect to the part of the said apparatus firstly described, I claim the combination which I have described of a common safety valve, with a piston or plunger operating in a cylinder filled with oil or other fluid, on which the steam is allowed to act; such combination being effected in such manner, that when the said common safety valve is in proper order, it can act to rise to a certain point independently of the plunger; but so, that whenever the said common safety valve sticks fast in its seat, from any cause, or when it is raised too violently, the piston or

plunger is brought into operation,—in the first case, to help it by the pressure of the steam on the fluid raising the said piston or plunger; and in the second case, to check and regulate its motion as hereinbefore described.

And as to those parts of the said new or improved apparatus in which a fusible metal is applied, I do not claim generally the application of a fusible metal to be acted upon by the heat applied to steam boilers; but I claim that combination of pipes, cocks, steam boxes, or chambers, and other parts which I have described, by the effect of which the heat of the steam alone, or of the steam and water, and heated surface, near or within which the fusible metal is placed, is admitted to act upon such fusible metal, and to open, by melting it, a passage for the superabundant steam to escape. The parts aforesaid being so combined also, that the apparatus may operate as I have described, and be replaced afrerwards in a state to operate again, without necessarily stopping the engine.

And in respect to that part of the said new or improved apparatus, which consists of an improved float apparatus, I claim only that combination of parts which I have described in reference to figs. 25 to 30

And lastly, I claim an apparatus composed of dampers, suspended themselves or connected with and restrained by other suspended heavy or loaded bodies; the effect of such dampers to close partially or wholly the flues or chimney of a steam-boat boiler, being produced by applying the motion of the vessel itself, when it inclines over to one side, in combination with the resistance to departure from verticality of the suspended dampers, or of the heavy bodies with which they are connected, as I have hereinbefore described.—[*Inrolled in the Rolls Chapel Office, November*, 1837.]

To Paul Chappé, *of Manchester, in the county of Lancaster, spinner and manufacturer, for his invention of certain improvements in the means of consuming smoke, and thereby economising fuel and heat in steam engine and other furnaces and fire-places.*—[Sealed 31st October, 1838.]

These improvements in the means of consuming smoke, and thereby economising fuel and heat in steam engine and other furnaces and fire-places, consist in the introduction of a thin sheet of boiling water, which is to be projected under the bottom of the boiler over the furnace fire in a continuous stream, and thus, by proceeding over the fire in front of the bridge of the furnace, prevents the escape of the smoke from ascending the flue or chimney, as the action of the water on the unconsumed combustible matter, which would otherwise escape in the form of smoke, occasions the whole to be burned so effectually as, while it greatly increases the amount of heat usually evolved, prevents, at the same time, the annoyance which unburned combustible matter must ever occasion.

The water to be employed for effecting the above purpose, must be heated to two hundred and twelve degrees of Fahrenheit's thermometer, that is, at or near the boiling point, and is to be projected into the furnace by any suitable mechanical means; but as the small apparatus, which will be required for the purpose, must necessarily be slightly varied in its construction, and so modified in its application, in order to be suitably adapted to whatever arrangement of furnace or fire-place in which it may be used,—I have attached to these presents a drawing, in which I have represented such an apparatus as will be required to effect its application to the ordinary furnace of

a low pressure steam boiler, and which drawing will also sufficiently illustrate its adaptation to other furnaces or fire-places.

Plate XI., fig. 1, represents a sectional elevation, taken longitudinally, of an ordinary steam engine furnace and boiler, with a pipe suitably attached to the same, through which the stream of boiling water is to be projected; fig. 2, is a horizontal or plan view of the same; and fig. 3, a vertical cross section, taken immediately in front of the boiler.

It will be observed that similar letters of reference are marked upon corresponding parts in all the figures. *a, a,* represents the grate or fire-bars of the furnace; *b,* the bridge; and *c, c, c,* the ordinary flues leading to the chimney. *d, d, d, d,* is the boiler; *e,* the feed pipe; *f,* the steam pipe.

The only mechanical contrivance which is necessary for carrying my invention into effect, is the insertion of a small pipe or tube *g, g,* into the interior of the boiler, and it is most simply introduced through the side, as represented in fig. 1; this pipe or tube must have its upper end open, and just below the ordinary height of the low water line in the boiler, so that the pressure in the boiler will be sufficient to force the water down the pipe *g,* and to project the water into the furnace. This pipe is furnished with a vessel or receptacle *h,* for the purpose of receiving any deposit of mud or other matter which may precipitate from the water; *i,* is a pipe and tap through which such deposit may be removed from the vessel *h,* at suitable intervals; another pipe *j,* also proceeds from the vessel *h,* which is provided with a regulating stop cock *k,* in front, and terminates within the furnace close under the boiler in a mouth-piece, consisting of one or more branches, as represented in figs. 4, and 5. This mouth-piece or mouth-

pieces are constructed of brass, and pierced with fine holes to admit of the passage of the water, and are screwed to the pipe *g*. These holes being pierced or bored in radial directions, diverging from the centre of the pipe, as shewn in the detached fig. 5, will assist the operation by spreading the sheet of water above the surface of the fire, when by the inflammation of the gases evolved by the decomposition of the water, the smoke will be readily consumed, and thus cause a considerable economy of fuel employed in the generation of the steam.

These improvements in the consumption of smoke, besides having for their principal object the saving of fuel, have also a considerable advantage in being applied to boilers used for the generation of steam, as the peculiar and requisite situation of the pipe *g*, by being just below the low water mark of the boiler, will thus serve as an indicator of the quantity of water in the boiler, and thus exhibit any liability to burn out or burst; for as the water line falls below the mouth or upper end of the pipe *g*, the water will no longer be projected over the surface of the fire, and thus smoke will issue from the chimney, and warn the engineer of the approach of danger.

It is also very advisable to have a small sheet or stream of hot water projected in a similar manner, either at the end of the flues or in the chimney, in order most effectually to destroy such smoke or other combustible matter, which may have escaped over the bridges of the furnace during the operation of firing or any casual opening of the fire doors; the supply pipes, in such cases, may be taken from the end of the boiler next the chimney or flue.

In the application of this invention to other furnaces or fire-places than those used under steam boilers, the water must be supplied to the pipe which is to project it over the fire, from any convenient cistern or tank, in suitable

connexion with such furnaces or fire-places, and heated to the required degree, being projected by its own gravitation.

Having now particularly described my invention of improvements in the means of consuming smoke, I desire it to be particularly understood that, as I have before stated, the apparatus or pipes must be always modified, and constructed to suit the peculiar position and application of the same; and that I have shewn in the drawings, for the sake of illustration, the best practical mode of applying the same to an ordinary boiler for a stationary steam engine, and which I have found to have the desired effect; yet, as the circumstances of its application must vary, and may be adapted by competent mechanics in many different modes, I claim as my invention the projection of ***a thin sheet or stream of hot water, or a shower of hot water,*** over the surface of the fire, or in the flues or chimneys, (the water being at or near the heat of two hundred and twelve degrees of Fahrenheit's thermometer,) and its application to the furnaces of stationary, marine, or locomotive steam engines, and all other furnaces and fire-places, where the said invention may be applied.—[*Inrolled in the Rolls Chapel Office,* 1839.]

Specification drawn by Messrs. Newton and Berry.

To JOSEPH BOLTON DOE, *of Hope-street, Whitechapel, in the county of Middlesex, Iron-founder, for certain improvements in apparatus used in the manufacture of soap.*—[Sealed 14th June, 1838.]

THIS invention of certain improvements in apparatus used in the manufacture of soap, consists in the construction

and adaptation of a novel and improved frame of metal, to be used in place of the ordinary wooden frames employed in such manufacture. Into these frames the hot liquid soap is poured from the boilers or coppers, in order to be cooled and set, or hardened, so that the soap may be cut up into bars or cakes, of the usual form, in which it is sold, as an article of commerce.

In the ordinary process of soap making, the apparatus, commonly called the "soap frames," consists of a number of rectangular frames of wood, commonly called "lifts," each being about *five* inches deep, and of any required length and breadth; which lifts of wood are usually attached together by tenant and mortice, or by grooves, and placed one upon another to any height required by the manufacturer, in order to prevent the soap leaking or escaping between them. These wooden frames are necessarily of sufficient thickness to ensure the required strength; and wood, the material of which they are composed, being a bad conductor of heat, the cooling proceeds slowly; the soap is therefore required to remain a long time in these frames before it becomes properly set or hardened, which generally occupies from five to seven days; and when it is so set or hardened, these wooden lifts have severally to be removed from the block of soap by hand, in order that the block of soap may be cut up for sale; whereas my new or improved soap frames being constructed of *metal*, which is a quick conductor of heat, the caloric or heat is given off from the mass of soap in much less time than from wooden lifts; and being formed of three or more parts, are capable of being quickly separated or removed from the mass or block of soap, with very little labour.

These improved soap frames are formed of cast or malleable iron, or other metal, or mixture of metals, each consisting of a bottom plate or bed, with two sides and ends,

which, when fastened together at their junctions, form a rectangular chamber of the required dimensions, and may be made of any height desired, and can be quickly disconnected when the soap is cold and set.

The accompanying drawings exhibit two arrangements or constructions of the soap frame, which will be sufficient to explain this invention; although I do not mean or intend to confine myself to the precise form or construction therein shewn, as the same may be varied to suit the will of the manufacturer.

Plate XI., fig. 1, is a geometrical elevation of the side of these improved soap frames; fig. 2, a similar elevation of the end of the same; fig. 3, a section, taken transversely through the frame, to shew the interior; fig. 4, is a perspective representation of the frame in the same condition as the former figures, viz.,—when put together, and supposed to be filled with melted soap; and fig. 5, is a geometrical elevation of the same, when the sides and ends are thrown open, and the mass or block of soap is left exposed ready to be cut up in cakes.

A, is the bottom plate or bed, mounted upon castors or rollers *a, a,* to facilitate its removal from one place to another; B, B, are the two side plates, each of which is connected, in this instance, to the bottom part A, by strong hinge joints *b, b*; C, C, are the end plates, one of which is attached to the side plate B, by permanent fastenings,—as screw-nuts and bolts *c, c, c*; but they may be rivetted, or connected together in any other way. The other junctions, between the ends and side pieces, are secured by moveable bolts and screw-nuts *d, d, d,* which can be attached or detached at pleasure; *e, e,* are pieces of wood fastened to the top edges of the side plates, for the purpose of forming rests for the ladles containing the liquid soap when the frames are being filled; *f, f,* are chains connected to the

opposite ends and sides, for the purpose of allowing the attendant to lower them easily, and as safeguards against accidents.

These metal frames are brought into use in the following manner:—The workman first secures the joints of the two ends and sides by the moveable bolts and thumb-screws *d, d,* which will render the frame ready to receive the soap. When the soap has become cooled and hardened, (which will seldom take more than from forty to fifty hours in these metallic frames, or less if refrigerated with cold water,) he unscrews and withdraws the bolts of the moveable fastenings *d, d, d,* and lowers the two side plates, each carrying with it one of the ends of the frame, (as seen in fig. 5,) when the mass of soap is left exposed, to be cut up for sale.

Fig. 6, is a perspective representation of another construction of these improved *metal* soap frames, in which the ends are divided into two parts, each side plate having two portions of the ends attached to it, either by being cast together in one piece, or by being connected to the sides by other means. The operation of this frame is precisely the same as in the former instance, but the two sides when removed from the mass of soap, carry with them a portion of each end.

Having now described and ascertained the nature of this invention, and the manner in which the same is to be carried into effect, I wish it to be understood that I do not confine myself to the precise arrangement and construction above shewn or described, as the same may be varied without departing from this invention; and that various kinds of fastenings may be used in lieu of the screw nuts or bolts above-named; for instance—bolts, with slots or grooves in them, with wedge-formed keys, or catches and latches, may be applied, to fasten the portions together; also, that

the hinges on the side pieces, may be dispensed with by placing studs or pins on the bottoms of the side and end pieces, which may take into grooves or holes in the bed or bottom plate. And further, that long bolts may be passed through both side pieces, with screw nuts at the ends, to fasten the sides and ends together, instead of the short screw bolts and nuts, shewn in the drawing; and by many other contrivances, all of which will be well understood by any practical engineer or mechanic, and therefore it is not necessary for me to particularly describe them.—Also, that any packing, as wood or leather, may be placed between the junctions of the various parts, if thought desirable.

In conclusion, I would remark, that the invention which I desire to be secured to me, by the above patent, is a metallic frame, composed of a bottom plate or bed, with moveable ends and sides, capable of being securely joined together, so as to form a chamber to receive the liquid soap, to be cooled and hardened, and capable of being readily separated and removed from the mass or block of soap, when cooled, in order that the block of soap may be cut up for use.—[*Inrolled in the Rolls Chapel Office, December,* 1838.]

Specification drawn by Messrs. Newton and Berry.

To CHARLES OSBORNE, *of Birmingham, in the county of Warwick, corkscrew manufacturer, for a certain improvement or certain improvements in the construction of corkscrews.*—[Sealed 2nd July, 1839.]

THESE improvements in the construction of corkscrews, consist in the adaptation or application of springs to the corkscrew, for the purpose of starting or drawing out the cork a short distance from the neck of the bottle, by the

elastic force or leverage of such springs, when the worm of the corkscrew has been sufficiently inserted into the cork.

There are many modes of adapting such springs, and many descriptions or forms of springs capable of being applied to this purpose, all of which modifications it is not necessary for me to describe, although they may be suitably applied to act upon what I consider to be the principle of my invention or improvement;—I shall therefore exhibit in the drawings, hereto annexed, such forms and modes of adaptation as I have found well suited to effect the object of my invention, without confining myself to the precise arrangement of construction of the parts therein shewn.

Plate XII., fig. 1, represents one of my improved corkscrews, having bow springs applied or adapted thereto, for the purpose above stated; fig. 2, is a section of the same; and fig. 3, exhibits the several parts thereof detached. *a*, is a conical ring or collar, intended to fit on to the nozzle of the bottle; *b*, is the worm-shaft or screw, to be inserted into the cork. The upper end of this shaft is affixed by a screw, or otherwise, to the stem *c*, which is made fast to the handle *d*, by a screw and nut, or other fastening. A disc or cap-plate *e*, has a hole through its centre, in which the spindle turns freely; and below this plate a tube *f*, embracing the spindle, acts as a washer or collar. The conical collar *a*, is connected to the cap-plate *e*, by bowed spring pieces of steel or other suitable material *g*, *g*, *g*, *g*, firmly riveted, or otherwise fixed at their ends to the collar *a*, and to the plate *e*; which bowed pieces, when compressed, act between the neck of the bottle and the plate *e*, as springs.

In fig. 1, it will be seen that the improved corkscrew is represented as applied to the neck of a bottle, and the

worm inserted into the cork, which is done by turning the handle or lever in the ordinary way.

The introducing the worm into the cork a sufficient distance, necessarily compresses the bowed springs, (as shewn in this figure,) and thereby brings them into a state of tension; and when the elastic force of the springs exceeds that of the friction of contact between the cork and the bottle, it will cause the cork to be drawn up a short distance, as shewn by dots in fig. 1, and thus start the cork up out of the neck of the bottle, when it can be easily drawn out in the ordinary way, without exerting the physical force necessary with a common corkscrew.

The cork, after it has been removed from the neck of the bottle, may be discharged from the worm or spindle in the ordinary way, or by any suitable mechanical means.—I sometimes apply a contrivance shewn at fig. 4. In this instance, the worm is continued higher up the spindle than in the former figures, and a block or piece *h*, having a hollow screw within it, is placed so as to work upon the worm. Two side pieces or ears extend from the block, having eyes which slide upon two upright guide-rods *i*, *i*; these guide-rods are fastened below to the conical collar *a*, their upper ends being placed in holes formed in the plate *e*, through which they pass when the springs are compressed. On the corkscrew having been removed from the bottle, with the cork upon its worm, it is only necessary to turn the handle *d*, in the reverse direction to the coil of the worm, when the block *h*, will be caused to slide down between its guide-rods, and push the cork off the worm.

Fig. 5, shews another modification of construction and adaptation of springs to a corkscrew for effecting the objects of my invention, in which modification a helical, or what is commonly called a spiral or coiled spring, is used instead

of the bow springs, shewn in the former figures. *a*, is the conical collar, intended to fit upon the neck of the bottle; this collar is connected by two, three, or more rods *b*, to a plate or disc *c*, having a hole in the centre, through which the spindle turns freely; *d*, is the handle, connected to the worm-spindle or shaft *e*, *e*, in any convenient manner; *f*, is a plate or disc on the spindle, which has a collar or rim, working against its upper side; and between the two plates *c*, and *f*, are placed one or more open coiled springs *g*, *g*, which springs may be enclosed or covered by a box, or any ornamental casing. On the worm being introduced into the cork a sufficient distance, the force or resistance exerted between the neck of the bottle and the plate *f*, will cause the springs *g*, to be compressed, which will continue as the worm is being introduced further into the cork, or until the elastic force of the springs overcome the friction of contact between the cork and the bottle, when the cork will be started, and can easily be drawn.

Having shewn different modes of adapting springs to a corkscrew, I again repeat, that I do not intend to confine myself to any particular mode of applying them, nor to any particular form of springs, as the principle of my invention, viz.—that of obtaining an elastic force for drawing up or starting the cork upwards in the neck of the bottle, by means of springs, may be variously obtained, and the application thereof to the purpose differently modified. —[*Inrolled in the Rolls Chapel Office, January*, 1840.]

Specification drawn by Messrs. Newton and Berry.

To Charles Arter, *of Havant, in the county of Southampton, plumber and glazier, for his invention of certain improvements on cocks or taps for drawing off liquids.*—[Sealed 12th August, 1834.]

This invention consists in the application of an additional packing to cocks or taps, whereby leakage is prevented.

The figure in Plate XII., represents a section of part of a cock, with the improvement attached thereto. *a*, is the barrel or part of the cock that is inserted in the vessel; *b*, is the spout or exit; *c*, is a conical valve; and *d*, is the additional elastic packing. The rod *e*, which carries the valve *c*, and additional packing *d*, has a quick thread screw *f*, formed on its end;—this screw passes through a female screw, formed in the body of the tap, and is terminated by what the patentee calls a "*triangular square*" *g*. A metallic ring *h*, through which the rod *e*, passes, abuts against a shoulder *i*, formed in the interior of the tap;—this ring is pressed close against the shoulder by screwing the head of the cock sufficiently tight, so as to compress the packing; it is retained there by the screw *j*, which prevents any part of the cock from receding.

In large cocks, it may be deemed necessary to have a stuffing-box, through which the rod *e*, should pass; if such stuffing-box should be required, it is formed partly of metal and partly of leather. The metal shewn at *k*, *k*, being divided into segments, the packing may be compressed or tightened round the rod *e*, by the screws *l*, *l*.

The cock works in the following manner:—Upon turning the "triangular square" *g*, the screw *f*, will withdraw the valve *c*, from its seat, and press the packing *d*, close against the metallic ring *h*, and prevent any of the liquid from flowing into the interior or working part of the cock.—[*Inrolled in the Inrolment Office, February*, 1835.]

To George Haden, *of Trowbridge, in the county of Wilts, engineer, for his invention of certain improvements in the machinery applicable to the manufacturing of woollen cloth.*—[Sealed 24th February, 1834.]

The object of this invention is to give an oblique motion to the card or teasle frames of an ordinary gig mill.

There are two methods pointed out in the specification, by which this end may be attained:—the first is by means of a grooved wheel, mounted on the main shaft of the machine. The groove in the wheel is so arranged, that the teasles or cards shall, in the course of their revolution, brush the cloth first, in an oblique direction, from right to left, then in a longitudinal direction, or the way of the warp; and lastly, in an oblique direction from left to right. Now, as all the teasle frames have a separate and different motion, it will be evident that this mode of raising the pile is preferable to continually brushing in a longitudinal direction.

The second method pointed out for obtaining the required motion, consists of a train of wheels, described by the patentee as a "*sun and planet motion,*" actuated by a lever, one end of which is connected to the periphery of an excentric wheel, mounted on the main shaft; and as the excentric revolves, it gives to the lever connected to it a backward and forward or reciprocating motion, and which motion being communicated to the train of wheels before mentioned, causes the teasle or card frame to slide from side to side on the gig barrel, and thereby give the required dress to the cloth.

The figure in Plate XI., is a diagram of the first motion, or that obtained by the grooved wheel. *a*, is the main shaft; *b*, *b*, represents part of the framing of the barrel;

c, c, are sliding frames, containing teasles or cards; *d,* is the grooved wheel, formed on the block *e,* which is loosely mounted on the main shaft; *f,* is a lever, having pins or studs *g, g,* formed on its end;—these pins or studs move in the groove *d,* and the required sliding motion is communicated from them to the teasle frames *c, c,* by connecting arms or rods *h, h.*

It will now be evident, that as the barrel revoles, the teasle frames will be made to slide laterally as the pins or studs *g, g,* move along the inclined part of the groove in the wheel; but, when they arrive at that part of the groove which is a right angle to the axis, the teasles in the said frames will brush the cloth in a longitudinal direction, or the way of the warp.—[*Inrolled in the Inrolment Office, August,* 1834.]

To George Nelson, *of Leamington Priors, in the county of Warwick, gentleman, for his invention of a certain new or improved process or processes, by the use of which the qualities of a certain gelatinous substance or gelatinous substances, called isinglass, may be improved.*—[Sealed 22nd May, 1837.]

The gelatinous substances employed, according to this invention, are the impure and inferior sorts of isinglass, commonly known by the names of honeycomb pipe or tongue block, lump samony book, and samony leaf. These substances are more impure and much less soluble than the best sort of isinglass, imported into this country under the name of Russian leaf and staple, which is in itself, as imported, so pure as not to require any further operation.

The impurities contained in the first-mentioned articles

are bits of skin and flesh and other extraneous matters, which are not easily dissolved. The substances to be employed should be cut into thin pieces, if necessary, and subjected to the process of maceration for twenty-four hours, if the substances are thin; but, if in lumps of any considerable thickness, they may be left in the macerating vessels for from two to six or eight days, according to circumstances. In this process they are subjected to the action of a solution of caustic alkali, consisting of two parts of potass or three parts of American pearlash, one part of freshly-burnt lime, and thirty parts of water.

It is easy to determine when the matters have become sufficiently macerated, by means of a fork or other suitable instrument. When this is correctly ascertained, the gelatinous substances should be removed in wooden trays or sieves, and piled one on the other in a suitable vessel, for the purpose of being washed;—this vessel is furnished with supply and waste pipes, the former of which allows water to flow into the top part of the vessel, and the latter draws it off.

The washing operation should be continued for two or three days, or until all the alkali is entirely removed. The gelatinous substances are then to be placed in a close closet, of the ordinary construction, and subjected to the action of sulphurous acid gas, obtained from the combustion of sulphur, within the closet. After this operation has been continued for a sufficient length of time, the gelatinous substances must be again washed to remove the sulphur, after which they should be dried by a draft of cool dry air,—the temperature of sixty or sixty-five degrees of Fahrenheit is preferred for this operation; the isinglass thereby produced and purified is then fit for use.

The patentee does not claim, as his invention, any of the processes or operations above described, as applied to

gelatinous substances in general, but confines himself to the application of caustic alkali to the several gelatinous substances, called isinglass, that are mentioned in the commencement of the specification, that is to say:—the inferior or impure descriptions, known by the names of honeycomb pipe or tongue block, or lump samony book, and samony leaf, for the purpose of rendering the same more pure, more soluble, and more generally useful, than they are in the state in which they are imported into this country. It being already observed, that the superior isinglass, as for instance, the best Russian leaf and staple, possess these qualities without the aid of this invention.—*Inrolled in the Inrolment Office, November,* 1837]

To Barclay Farquharson Watson, *of Lincoln's Inn Fields, in the county of Middlesex, solicitor, for improvements in crushing or preparing New Zealand flax, (Phormium Tenax.)*—[Sealed 17th December, 1838.]

This invention relates to a new or improved method of constructing the bed of a machine for crushing flax. The improvement consists in forming the bed of the machine of blocks of wood, placed in a vertical position, the grain of the wood also being upright.—These blocks of wood are arranged in such a manner that no two contiguous blocks shall be of the same height,—the bed of the machine will therefore present a very rough and uneven surface, and the crushing and preparing process may thereby be performed in a much more advantageous manner than has been done heretofore.

The construction of the machine will be better understood by reference to fig. 1, Plate XII., which represents

a transverse section taken through the middle of the machine, and showing the manner in which the bed is formed. ***a, a, a,*** are upright blocks of wood (oak or elm is preferred,) of various altitudes, the difference varying from a quarter of an inch to two inches, and bound together by circular hoops or bands of iron, so as to form one solid firm circular bed, over which the crushing roller *b*, passes. The upright blocks of wood which form the bed, are made square, and a further degree of irregularity may be given to their surfaces, by making grooves, radiating from the centre of the machine, as seen in the plan view.

The crushing roller *b*, is made of granite, and has grooves formed on its periphery. It is connected by its axle to the upright shaft *c*, through which the said axle passes, as seen in the plan view, fig. 2. The shaft *c*, is actuated by bevil gear, as will be readily understood.

In conclusion, the patentee says, having now described my invention, I wish it to be understood that I lay no claim to the machinery for actuating the crushing roller, but I claim as my invention, the mode of crushing and preparing New Zealand flax, (phormium tenax) by means of a bed or surface, and suitable roller, such as has been hereinbefore described.—[*Irolled in the Inrolment Office, June*, 1839.]

To Samuel Smith, *and* William Smith, *of Luddendon Foot, near Halifax, in the county of York, worsted spinners, for their invention of improvements in machinery for combing or cleaning sheep's wool and goat's hair.*—[Sealed 23rd May, 1837.]

Although this invention is described at very considerable length, and the specification is accompanied by several

sheets of elaborate drawings, yet the essential features thereof, may be described in a very few words:—

The wool or hair is fed into the machine from an endless cloth by a pair of plain feeding rollers, and a pair of rollers, formed as brushes, assisted by a current of air; the combs for receiving or carrying the hair from the rollers are mounted in a revolving frame or cylinder, the arms, axle, and other parts of which, are made hollow for the purpose of receiving steam at a high temperature, so as to communicate heat to the combs; as, however, this method of heating the combs is not mentioned among the claims of invention at the end of the specification, we suppose that the patentees do not consider that that constitutes any part of their improvements.

The combs on the revolving cylinder having received the wool or goat's hair from the feeding rollers; the cylinder continuing to revolve, brings the combs, loaded with wool or hair, to the opposite end of the machine, in which situation, the wool or hair is drawn from them by a pair of fluted drawing rollers, set in motion in any convenient manner.

There are one or two different methods of placing and actuating these drawing rollers; but, although different, they so much resemble the arrangement above described, as to render it unnecessary to enter into any further description.

The following is a verbatim copy of the claim attached to the specification;—the patentees say, "having now described our invention, we would remark, that we are aware that many contrivances have been before resorted to for applying combs to wheels or revolving axles, in order to comb out and clear the wool and goat's hair, and to fill the combs therewith; we do not, therefore, claim the same, nor do we claim any of the parts of the ma-

chinery shewn or described in their separate condition, nor in the combined condition, other than is hereafter particularly pointed out; but what we claim as our invention is, first, the mode herein described of drawing off the wool or goat's hair contained in combs, by means of rollers, the essential feature of such rollers, being the drawing off of the wool from the face of the combs; we do not, therefore, confine ourselves to the precise arrangement of mechanical parts for giving motion to such rollers, provided the general principle of their action be retained; nor do we confine ourselves to the mode described for filling the combs, as it will be evident, that the apparatus for, and mode of drawing off the wool or hair, may be employed in whatever manner the combs be filled.—Secondly, we claim the mode of feeding in the wool or hair from a feeding cloth, by means of the rollers *o, o,* aided by, and in combination with currents of air and revolving brushes to combs, placed on a revolving axis, by which means we are enabled to clear out and comb the wool or hair more effectually, than when a feeding cloth and feeding rollers are alone employed.—Thirdly, we claim the application of streams of air to lay the wool suitably for the combs, as above described; and fourthly, we claim the mode of drawing off the wool or goat's hair from combs (placed on a wheel) by means of drawing rollers, passing from end to end of the combs, without the necessity of removing the combs from the machine, as above described."—[*Inrolled in the Inrolment Office, November*, 1837.]

To Thomas North, *of Mitre-street, New Cut, in the county of Surrey, card, paper, and metal piercer, for his invention of an improvement in the manufacture of wire.*—[Sealed July 19th, 1837.]

This invention is a method for making wire from zinc, and for effecting this object, three distinct operations are required, which may be thus described:—

A plate, of the best malleable zinc, must be divided or cut into square bars or strips, by means of saws, or circular discs or cutters,—saws are preferred when the thickness of the zinc plate exceeds a quarter of an inch. The square rods, bars, or strips, thus produced, are then to be submitted to the condensing operation; for this purpose, they are passed between grooved rollers, by means of which they are not only condensed, but the edges of the strips or rods are rounded at the angles, and therefore become more suitable for the after process of drawing, which is performed in a similar manner to the process of drawing iron or other wire.

The grooves in the condensing rollers progressively decrease in size, so that the fresh cut bar or strip of metal, is merely slightly compressed, and rounded on the edges in the first groove.—In the second, it becomes more compressed, and so on until it is reduced to the required size. It therefore will not be necessary to anneal the zinc rods or bars, but they may be progressively drawn down to the required size without any other process except the condensing process, performed by the grooved rollers previous to drawing.

As the success of the operation of drawing depends, in a great measure, on the condensing process, it is as well to call particular attention to its utility and necessity, for by

this means the zinc is condensed, and becomes more suitable for drawing.

In conclusion, the patentee says, "having now described my invention, I wish it to be understood, that I lay no claim to the apparatus or machinery employed, as it is similar to that which has been before used for making wire from other metals, and for other purposes; but I claim, as my invention, the mode herein described of producing wire from zinc, by means of the conjoined process of the rollers and subsequent drawing of the bars, rods, or strips of zinc; and I also claim the application of saws and circular cutting instruments, for dividing plates of zinc into rods or bars, in the process of making wire from that metal."—[*Inrolled in the Inrolment Office, January*, 1838.]

To Thomas Vale, *of Allen-street, Lambeth, in the county of Surrey, coach joiner, for his invention of improvements in hinges.*—[Sealed 13th December, 1837.]

This invention is described as consisting in improvements in the construction of hinges, whereby by means of sliding axles, and moveable stops, doors, gates, and other structures may be taken down and put up again with facility, without removing the hinges.

There are three different modifications of hinges, shewn in the drawings, to effect the above object; the invention, however, does not appear to us to be of sufficient interest to warrant us in giving sketches of the hinges, especially as the patentee does not confine himself to the precise arrangement shewn; but claims constructing hinges by means of sliding axes and stops, so as to allow doors, gates,

or other structures, to be removed and replaced with facility, without the necessity of unscrewing the fastenings which attach the said hinges to the door or door posts.—[*Inrolled in the Inrolment Office, June,* 1838.]

To JOHN HENFREY, *of Weymouth-terrace, Shoreditch, in the county of Middlesex, engineer and machinist, for his invention of certain improvements in the manufacture of hinges or joints, and in the machinery employed therein.*—[Sealed 25th October, 1838.]

THE hinges made according to this invention, are formed from sheet or plate iron, or other metal. The metal being cut or formed into strips of suitable lengths, is passed between two rollers, which bend it up very nearly into the form of a V, except that the angle is rounded off; from these it is passed between two other rollers, which compress the sides of the strip, and bring it into the form of a long U; the metal is then passed between a third pair of rollers, where the sides are brought into close contact, leaving an eye in the lower part for the centre pin of the hinge. The strip of metal, thus prepared, is then to be cut up into the required lengths, and those parts are cut away which receive corresponding parts from the other part of the hinge.

The patentee says, "I claim, firstly, the exclusive privilege in the manufacture of hinges or joints, of bending a narrow plate or strip of iron, so as to form a strap or bar, having, along one of its sides, a hollow knuckle, adapted to receive the pins of hinges, the said strap or bar being made of a sufficient length, that it may be afterwards divided transversely, and made into any convenient number of

hinges. Secondly, I claim the manufacture of hinges, made of brass or other metal, by forming a bar or strap, having, along one of its longitudinal sides, a hollow knuckle, adapted to receive the pins of hinges, the said strap or bar being made of a sufficient length, that it may afterwards be divided transversely, and made into any convenient number of hinges. Thirdly, as regards the improvement in the machinery for making hinges, which forms the second part of the title of my invention, I claim the use of rollers of the form or figure, and combined in parts or sets, in the manner shewn in the drawings, and all modifications thereof."—[*Inrolled in the Inrolment Office, April,* 1839.]

To LORD BARON AUDLEY, *of Raleigh Castle, in the county of Stafford, for his invention of an apparatus or machine, as a substitute for or, to be attached to, locks or other fastenings, which he denominates a " lock protector*."—[Sealed 11th March, 1834.]

THIS invention is divided into two parts. The principal improvement is denominated a lock protector, and consists in covering the back part of the key-hole with a piece of skin or bladder, in such a manner that it would be impossible even to attempt to pick the lock, without the owner's knowledge that such an attempt had been made.

A cup or cover, from the centre of which a pin projects, is screwed on to the back of the lock, over the key-hole; and when it is intended to apply the detector, this cup is unscrewed, covered with a piece of skin or bladder, and screwed on to the back again. The projecting pin, over which the skin or bladder is distended, is, by these means,

inserted into the key-hole, and thereby prevents any key or other instrument from unlocking the door, without previously breaking or abrading the skin.

The other improvement consists in a certain arrangement of levers and tumblers, which are intended to render the lock difficult to pick. The key acting upon what is called "the first movement," thereby raises the tumblers, and allows the bolts to be withdrawn.

There is, however, but little difference between this and many other locks, in which tumblers are used, except in the form of the said tumblers, which are two, four, or more, thin strips of metal, placed side by side.

The principal part of the invention is the manner of applying the skin or bladder to the key-hole of the lock, and which the patentee calls a lock protector.—[*Inrolled in the Inrolment Office, September,* 1834.]

To THOMAS EDWARDS, *of King-street, Holborn, writing and dressing case manufacturer, for improvements in the manufacture of hinges.*—[Sealed 3rd April, 1839.]

HINGES of the ordinary construction have two flaps or wings, by which they are, by means of screws, fastened to the door and door post or other situation, where they may be required.

The present invention is intended to supersede the use of these flaps or wings, and to substitute in their place stems or rods, with screwed ends, by means of which the hinge may be fixed in any situation. The stems are fastened to the socket, through which a pin is passed in the ordinary manner. Holes being bored in the door, the screwed ends of the stems are screwed up tight, or they

may be screwed up by a nut, which may be inserted into a hole made for the purpose, which hole may be afterwards filled up.

This invention possesses some novelty, but we are at a loss to discover any advantage arising from it, although the patentee says, they are particularly applicable to writing cases, and similar small articles, and look much neater than the ordinary hinge with flaps.—[*Inrolled in the Inrolment Office, October*, 1839.]

To DAVID JOHNSON, *of Glasgow, manufacturer, for certain improvements in the manufacture of hinges.*—[Sealed 20th July, 1839.]

THE hinges are made from sheet metal. The pieces intended for the hinge are first cut or punched out of the sheet of the required shape; they are then put in a machine, and the projecting pieces or tongues, or those parts which form the eye of the hinge, are forced forward into dies by means of a lever, actuated by a cam wheel, mounted on the main shaft.

The claim of invention is for "forming the eyes, through which the pin or rivet passes, to form a hinge, by forcing forward the metal, of which they are to be made, into dies or moulds, which, by their shape, turn the metal over into the form of eyes, as it is forced into the moulds."—[*Inrolled in the Inrolment Office, October*, 1839.]

To THOMAS BURR *of Shrewsbury, in the county of Salop, lead merchant, for improvements in rolling lead, and other soft metals.*—[Sealed 8th August, 1839.]

THIS invention is simply heating the rollers by means of steam, hot water, or hot air, for the purpose of facilitating the operation of rolling, when applied to soft metals, such as lead.

If steam is to be used, a circular hole, of about three quarters of an inch in diameter, is bored through the centre of the roller, and a steam pipe, in connection with a boiler, and furnished with holes, is passed into the roller, the ends of which are made steam tight in the ordinary manner. A waste pipe is attached to one end of the roller for the purpose of drawing off the condensed steam. The pressure of the steam in the boiler should be about ten pounds on the square inch.

If water is used, it is allowed to flow through the roller; and if hot air is employed, the air from a furnace or stove is propelled, through the hole formed in the roller, by means of fans, and thereby keeps the said roller warm.

The patentee claims the application of rollers, heated in the manner above described, to rolling lead and other soft metals.—[*Inrolled in the Inrolment Office, February,* 1840.]

To NICHOLAS TROUGHTON, *of Bread-street, in the city of London, gentleman, for an improvement in finishing ornamental walls, and other ornamental surfaces,—being a communication from a foreigner, residing abroad.*—[Sealed 14th November, 1835.]

THIS invention consists in the application of talc, in the state of powder, to walls or other cemented surfaces, for

the purpose of defending the painted or ornamental surface from the effects of the weather, and at the same time rendering such surface more beautiful and ornamental.

The method of proceeding is thus described:—The first coat of plaster, commonly called the "pricking-up" coat, is laid on to about three-eighths of an inch in thickness.—This coat is composed of two parts of metallic cement and one part of slacked lime, intimately mixed and beaten together. When this coat is thoroughly dry, the second or "floating" coat is laid on to the thickness of about a quarter of an inch more.

The second or floating coat is composed of similar materials, and in the same proportions as the first or pricking-up coat.

The third or last coat is composed of one part of finely-sifted metallic cement and one part of putty lime, well mixed togther.

When the second coat becomes thoroughly dry, the third is laid on, and worked with a wooden trowel; as the cement dries, this working with the trowel is to be continued until the surface becomes even,—it will then be in a condition to be ornamented with paint. The colours are allowed to remain until they are so far set that a steel or glass float, passed over them, will not injure them;—this will be readily ascertained after a little practice. The colours to be used are what are called water colours, and should be ground up with lime-water.

It is remarked, that ornamental slabs, of various shapes and devices, for tables and other purposes, may be made by affixing laths across a wooden frame, in the same manner that the ground-work for ceilings and walls is done, and then filling up and laying on the cement, and finishing the slab in the manner above described.

The patentee further remarks, that he does not confine

... and delicate, as
... it will be found desira-
... paper on the surface, in
... before passing the float

... the application of talc, in the
... ing of ornamental walls and
... the manner above described.—
... Office, May, 1836.]

To John Woolrich, of *Birmingham, in the county of Warwick, professor of chemistry, for an improved process for manufacturing carbonate of lead, commonly called white lead.*—[Sealed 11th October, 1838.]

This invention appears to be an improvement upon ... for making white ...

lead. In the latter, white lead is produced by the friction of small pieces of lead rubbing against each other in a vibrating or rotatory frame. The oxide thus produced is turned into a carbonate by the action of the atmosphere. It will, therefore, be perceived that white lead is produced mechanically, and not by the aid of acid solutions.

The present invention is for producing oxide of lead by mechanical means, with the assistance of certain acid solutions, and the product being acted upon by carbonic acid gas, becomes carbonate of lead.

The patentee describes his process in the following manner:—The ordinary lead of commerce is divided into small pieces, about the size of shot or grains of barley, in any convenient manner, such as by melting it and running it through a metallic sieve into water. A quantity of lead, so reduced, is placed in a cylindrical or hexagonal vessel, made of lead or earthenware, having a hole in the centre of each end, about one-sixth the diameter of the vessel. The small pieces of lead in the vessel are then moistened with the following acid solution, viz.—protoxide of lead, dissolved in dilute ascetic acid, in such proportions as completely to neutralize the acid, and cause the solution to be of the specific gravity of 1.60. The apparatus being thus prepared, and the cylindrical or hexagonal vessel being mounted in a horizontal position; rotary motion is given to the said vessel, and the lead therein contained is kept continually moistened with the solution.

The rotary motion given to the vessel keeps up a continual friction amongst the pieces of lead, and which, assisted by the solution, causes very minute particles to be detached therefrom, and form a product which may be easily removed by washing. The product thus obtained is removed every twelve hours, and fresh quantities of lead, moistened in the manner above mentioned, are added; so

as to keep up the original quantity in the vessel.—This product, and the fluid used in washing the same from the rotary vessel, are placed in another vessel, closed and kept constantly stirred by a spindle, which is moved round in the vessel. A stream of carbonic acid gas, obtained from a charcoal fire, is passed through the vessel, and the result will be carbonate of lead, or white lead, suspended in a liquid.

The lead is easily separated from the liquid by allowing it to settle for a few hours, when the carbonate, by its own gravity, will sink to the bottom, when the supernatant liquid may be drawn off by a syphon, or the carbonate of lead may be separated by filtration. It is then dried, when it will be fit for use.

The patentee here observes, that other solutions may be used, if preferred, viz.—a solution of protoxide of lead, dissolved in dilute nitric acid; or a solution of acetate of lead, in water; or a solution of carbonate of potash, or carbonate of soda, in water; or a solution of nitrate of lead, in water; dilute solutions of ascetic acid, or nitric acid, may also be used without being previously combined with protoxide of lead.

The hexagonal vessel should be about five feet long and twenty inches in diameter, with a round hole of from three to four inches in diameter, exactly in the centre of the ends thereof. About eight or ten hundred weight of lead, prepared as aforesaid, is a sufficient charge.

The patentee claims the use of all the solutions named, in combination with metallic lead; but he does not claim, as his invention, the mode of reducing the ordinary lead of commerce to pieces of such size as will render it available to the objects of the invention; nor does he claim the mode of obtaining carbonic acid gas from charcoal, as aforesaid; but he claims, as his invention, "the forming,

from the friction of the ordinary lead of commerce, moistened with any such solutions as hereinbefore mentioned, a product which may be converted into carbonate of lead, or white lead, by passing carbonic acid gas through such product, and then separating and drying the product so obtained, which is thereby converted into carbonate of lead, or white lead."—[*Inrolled in the Inrolment Office, April,* 1839.]

To George Haden, *of Trowbridge, in the county of Wilts, engineer, for his invention of improvements in the manufacture of a soap or composition, applicable to the felting and other processes, employed in the manufacture of woollen cloth, and other purposes in which soap is usually employed.*—[Sealed 8th October, 1838.]

This invention is merely for the substitution of castor oil instead of the oils or other fatty materials usually employed in the manufacture of soap.

It will not be necessary to describe the various modes of manufacturing, as the invention in no way interferes with them; and as they are all well known, the soap-maker will, of course, vary the materials, to be mixed with the castor oil, according to the object he desires to attain.

The patentee says, that five hundred weight of castor oil, mixed with caustic leys, made from one hundred weight of soda, produces a very good quality of soap, when boiled and manufactured in the usual manner.

The plant from which the castor bean is obtained is very productive, and would grow luxuriantly in the British colonies, particularly the West Indies; and should a demand arise for that article, it might be produced and im-

ported from thence at a very low cost, and render this country independent of foreign produce.

The patentee says, that he does not confine himself to any particular quantities, nor to any particular materials which may be mixed with castor oil in the manufacture of soap, as such proportions and materials will necessarily vary according to the quality and description of soap that may be required; but he claims, as his invention, "the application of castor oil in substitution of the oil and other fatty matters heretofore employed in soap-making."—[*Inrolled in the Inrolment Office, April,* 1839.]

Original Communication.

ON THE HOT OIL LAMP.

(To the Editor of the London Journal and Repertory of Arts, &c.)

Sir,—I beg permission, through the medium of your valuable Journal, in which the rights of inventorship are so well preserved, to adduce my claim as the original inventor of the Hot Oil Lamp, lately brought forward by Dr. Ure.

In Plate XI., you have a figure of my lamp, as invented and used in November, 1835.—It was originally intended for burning coal tar, and for which, when this fluid is free from solid impurities, it answers well. The principle of availing ourselves of the heat of the lamp to heat the oil or other fluid, is identical in mine and Dr. Ure's; but the method by which I effected this, is different from his, and I think somewhat better. Dr. Ure's lamp heats the oil, which is stagnant, in a vessel above, merely by radiation from the lamp chimney,—in mine the oil is heated by the direct appulse of the ascending currents of heated air, &c., which come from the wick and chimney, and impinge first upon the inner curved sides of the upper vessel *a*, and are caused still more to strike against them by a partial diaphragm at *b*; the currents of

heated air are also caused to pass downwards and lap over the outside of the vessel by means of the hood *c*.

But, moreover, I avail myself of the principle of *circulation*.—The lower vessel or reservoir *d*, is connected with the upper one *b*, by two tubes *e*, and *g*,—*e*, being japanned dull black, and *g*, having a polished metallic surface, by which the radiation of the glass or wire gauze chimney always preserves an excess of temperature in the former,—hence a constant circulation of the heated fluid in the lower and upper vessels.

By this arrangement, I obtained not only a far higher temperature than can be had in Dr. Ure's lamp, but a sufficient magazine of oil to burn as long as might be desirable, in place of being confined to the contents of the small hollow cylinder which forms the magazine of his lamp.

The rest of the lamp is of course obvious. There is an air screw at *k*, to enable the oil to come down to feed the wick; a filling screw or cap at *l*, and another to permit the occasional cleaning out of the lower vessel at *m*; and as the very worst of oil, or common coal tar, may be used, this cleaning requires to be done with caustic potass, to wash out the dregs.

This lamp was originally designed by me in 1835, to light part of a manufactory temporarily,—for other uses, a more ornamental form might be adopted, and any sort of shade may be used.

I am aware that mere questions of precedence of invention are generally, in Britain, esteemed of little importance, except in cases of patents. In the present case, however, I am induced to forward you the description of my invention, which I consider an improvement on the Hot Oil Lamp, as now public,—in the hope that it may not be found valueless.—

I shall, therefore, be obliged by your giving insertion to this communication, if suitable, in the London Journal.

I have the honour to be, Sir,

Your obedient Servant,

ROBERT MALLETT, Assoc. Inst. C.E.

NEWLY INVENTED GAS LIGHT.

On Wednesday, 13th May, the Count de Val Marino, the inventor of the new description of gas, for which he has obtained a patent, explained the nature of his invention, and exhibited the apparatus by which it is carried into effect, in the presence of His Royal Highness the Duke of Cambridge, the Marquis of Douro, Lord R. Grosvenor, Lord C. Somerset, Sir F. Trench, and several other distinguished and scientific persons, who assembled for the purpose in a building attached to the workhouse in Mount-street, Grosvenor-square, where the apparatus is now erected, with the view, it is understood, of the gas being used experimentally in some of the streets in the parish. In order to compare the patent gas with that now in use, three lamp posts have been erected at the top of John-street, Berkeley-square; one of them is lighted with the ordinary gas supplied by one of the public companies, another, having a burner of precisely the same description with the first, is supplied with the patent gas, while the third is not only lighted with the new gas, but is furnished also with a burner invented by the Count de Val Marino.

The apparatus for preparing this new gas was temporarily fitted up for this occasion, and the manner in which the gas is generated was explained in a very satisfactory manner to His Royal Highness and the company, by the Count de Val Marino, who speaks only in the French language. He pointed out the particular construction of the furnace and its arrangements in the following manner, as nearly as we could collect the facts :—There are three cylindrical retorts placed vertically side by side, and enclosed in a furnace of suitable dimensions, to heat them up to what is technically called a red white heat. This is obtained in a short time, with but a trifling cost for fuel. The requisite heat having been obtained, water is allowed to drop rapidly, but not to stream, into the first retort; and tar into the third one. We must here observe, that the three retorts are charged with coke broken into pieces about the size of a walnut. In the first retort the water is decomposed, the hydrogen is separated from

the oxygen, which, uniting with a certain portion of carbonised vapour, produces carbonic acid gas. This product, with the liberated hydrogen, now passes into the second retort, and it is in this retort that the carbonic acid gas is changed into oxide of carbon by passing through the heated interstices of the coke. The liberated hydrogen, with the other products, unite in the third retort with the superabundance of carbon which is produced by the decomposition of the tar, and thus is formed a pure carburetted hydrogen gas, not requiring any further purification.

The proportions of the water and tar to each other for producing the purest and strongest gas are, three parts of the former to one part of the latter substance—consequently, the materials being very cheap, the product cannot bear any great price.

This gas seems to be a very active and powerful agent, as it appeared in juxta-position with the common gas, and when carefully prepared, the flame it produces is clearer, and consequently more bright, than the same surface of the ordinary gas; and there are street lamps lighted from eight to nine o'clock in the evening in the street at the rear of the workhouse looking into Hill-street, where the qualities of the two gases can be accurately compared.

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 178, Vol. XVI.)

Feb. 21.

The President in the Chair.

"On Steam Engines, principally with reference to their consumption of Steam and Fuel."

By Josiah Parkes, M. Inst. C. E.

The above is the second and concluding communication on this subject; in the former, the generation of steam more par-

ticularly was considered: in the present, its application when generated. These are distinct questions, as it is the economy of steam which constitutes the dynamic perfection of a steam engine, whereas it is the economy of heat in supplying that steam which constitutes the perfection of the boiler as an evaporative vessel. These economic properties are totally independent of each other; they may co-exist in a maximum degree, or in very different degrees, and the degree of perfection which any particular class of engines, or which the particular engines of any class possess, is known from the weight of fuel burnt, of water evaporated, and the mechanical effect realised. As long as engines were constructed with but few varieties, or identical in their forms, the performance of one was a sufficient indication of the performance of all; but new forms of engines and new modes of practice being now introduced, a comparison of the performance on the several systems is a matter of deep practical and scientific interest. With the view of effecting this object, the author has collected all the authentic facts within his reach, and reduced them to common standards of comparison.

The effective power of steam engines may be ascertained either from the resistance overcome, or from the load upon the piston by means of the indicator; the former method being applicable to pumping, the latter to rotative engines. But the effective power of the steam in pumping engines, as thus ascertained, is far below the real effective power of the steam, and no exact comparison can be made by these means between the effective power of the steam in the two classes of engines. The useful effect is not synonymous with a true measure of effective power, since the duty is the true useful effect in a Cornish engine. The indicator, when applied to the Cornish engines, enables us to ascertain the absolute but not the effective power, so as to compare it with that of the rotative engine, since the friction of the engine and the load cannot be separately determined. The absolute power of the steam may also be ascertained from the relative knowledge of the elastic force of steam corresponding with the ratio which the volumes of water bear to each other. This

theoretical estimate requires however several corrections; among which the steam condensed by contact with colder surfaces, the steam consumed in filling useless places, and that lost by priming, must be particularly noted.

The relative performance of pumping engines is well expressed by the term "duty," that is, the number of lbs. raised one foot by a given quantity of fuel; and of rotative engines by the term "horse power," that is, the number of lbs. raised one foot in a minute, divided by 33,000 lbs. the standard measure of a horse. The performance of the rotative engine may also be estimated by duty, and of pumping engines by horse power. The results of these computations, for several engines, are tabulated in this communication.

The sum of the latent and sensible heat being constant for steam of all elasticities, the expenditure of both power and heat is truly measured by the weight of water consumed as steam; this measure is free from all uncertainty, and independent of all theory; the weight of water as steam equivalent to the production of a horse power in each engine, and the duty effected by one pound of steam, will denote the positive and relative efficiency of the steam and the heat. These indices of efficiency being referred to some standard, we learn, from the preceding data, the precise value of each engine in its use of steam and fuel; of its boiling apparatus, as a generator of steam; of the comparative efficiency of the steam and coal, or economy of power and fuel. The results which may thus be obtained are also exhibited in tables, accompanying the communication.

The power resulting from the expenditure of equal weights of water, as steam, being known, the boiler may be connected with the engines, and the relative extent of heating surface employed to furnish their power shewn. It will thus appear that equal measures of surface are quite inadequate to supply equal power, with equal economy, to different classes of engines. These results are tabulated in great detail, and it appears that the Cornish engineers now employ nearly eight times as much boiler surface for equal nominal power as that given by Watt's practice. But

taking into account the fuel burnt per horse power per hour in the two cases—the Cornish engine consuming 2½ lbs. per horse power per hour, and Watt's engine 8½—the true relation of the boilers is as 19 to 1. Many other relations of a similar striking character, may be deduced from these tables.

The detailed results of the experiments by Smeaton in 1772, on his improved Newcomen engine at Long Benton—by Watt, in 1786, on his rotative condensing engine, at the Albion Mills, are recorded in these tables; and it appears that the economy of the latter, as regards steam and fuel, was double that of the former, and approached very near to perfection in the use of power obtainable on that principle. The next great advance in the economy of fuel and power, is that made by the Cornish Engineers, whose performances, both with pumping and rotative expansive engines, far exceed any attained with the common unexpansive condensing engine. The superiority of two of these engines in 1835, doing a duty of 80 millions, exceeds the engines of Watt and Newcomen, by 2½ and 5 times in economy of power, and by 3½ and 7 times in economy of fuel.

The obtaining a standard measure of duty is of great importance; a heaped measure, as a bushel of coals, is highly objectionable, as the weight of such measure will vary from 84 to 112 lbs. In the Cornish reports, the bushel is fixed at 94 lbs. weight, as the standard of comparison, but some portion of a ton or one lb. would be a better standard. Other combustibles, however, as coke, peat, &c., may be used partially, or to the exclusion of coal, and under these circumstances some other standard of comparison is necessary, and with this view the author suggests a pound of water in the form of steam, as the best standard of duty. The work done by a given quantity of water, as steam, is a sure index of the quality of the steàm engine; it is a measure unaffected by variable calorific agents, and so long as engines continue to be worked by steam, so long will the performance of different engines be accurately guaged by their respective expenditure of water as steam. The accuracy of this measure depends on the physical fact of the constancy of the latent and sensible heat in

steam of all temperatures. The author has recorded twenty-eight experiments made on twenty-eight different days, on vaporization from the boiling point to 60 lbs. pressure above the atmosphere, which present a remarkable confirmation of the above law, and shew that the relative efficiency of steam in engines, is due to the manner of using it, and not to any change in its chemical constitution at different pressures. The manner of conducting these experiments, and the precautions taken to ensure accurate results, are detailed with great minuteness.

The author next proceeds to treat of the Locomotive Engine, and to discuss, compare, and tabulate the facts relating to this engine, in the same manner as he has done those of the stationary class. The qualities of the boiler of the locomotive, as an evaporative vessel, had been discussed in the first communication. The locomotive differs from the fixed non-condensing engine, only in the use of the blast, and the same method of measuring the effects of the steam, are applicable to both. Experimenters on the locomotive have generally attempted to determine the amount of resistance opposed to its progress, in preference to ascertaining the power expended in overcoming the resistance. The exact solution of either of these questions, would furnish all that is wanted; but the ascertaining the total resistance by an analysis of its several constituents, is attended with great difficulties, as the forces to which they are to be referred are so exceedingly numerous and variable, that the assigning the exact value to each at any one velocity, has hitherto eluded the talents of those who have pursued this method. M. de Pambour was the first analyst whose labours will require attention. The results given by this author in his practical treatise on locomotive engines and railways, were compared by Mr. Parkes with the results which he had obtained when experimenting on an engine of precisely a similar character, and discrepancies presented themselves which appeared totally irreconcilable. These and other circumstances led the author to consider, whether the resistance to traction would properly be deduced from the laws of

gravitation, or whether any certain results would be derived as to the amount of resistance on a level, from observations on engines and trains moving down inclined planes. The great object seemed to be to discover some criterion of the mechanical effect produced by a locomotive at all velocities, which would apply as practically and as distinctly to a locomotive, as duty to a pumping engine, or horse power to a rotatory engine. If this were possible, it seems of far less importance to distinguish the precise value of each particular unit of resistance, than to determine the relative sum of resistance and the relative expenditure of power at all velocities and under all circumstances. Now the term duty may be applied in the strictest sense of the term to the work done by a locomotive engine; for whether the engine drag a load whose resistance is 8 lbs. per ton, or whether a weight of 8 lbs. for each ton of matter moved, descending over a pulley and attached to the load, be considered as the moving force, the result is the same. If, then, the tractive force, or resistance per ton of matter in motion, which is the real load on the engine, be ascertained, the whole effect is found by multiplying this sum by the space passed over in feet; and the consumption of water as steam and of coke, being known, we have all the elements requisite for determining the duty performed by the steam or coke. The pressure against the pistons may be deduced from the sum of the resistances first calculated on the assumed resistance overcome at the velocity of the engine in each experiment; and the pressure on the pistons may also be deduced from the ratio of the volumes of the steam and water consumed. The results which may be obtained on these principles are tabulated, for the experiments of M. de Pambour, Robert Stephenson, and Dr. Lardner. In another table the author has recorded the reduction of each of these experiments to terms of horses' power, and has exhibited, under that denomination, the absolute power resulting from the steam used—that required to overcome the assigned resistance—their differences—and the power which balances the gross and useful duty. The construction of these most elaborate

tables, is described in great detail, and the consequences which follow from the tests thus obtained, are fully stated; and the author comes to the conclusion, that results inconsistent with the capabilities of the locomotive are perceptible in almost every one of the experiments. A condensing engine placed on wheels, with water of condensation transported for its supply, and made to drag a train along a railway, would require the same expenditure of water as steam, to produce a given effect, as if fixed; a non-condensing engine also is one and the same machine, whether fixed or locomotive, excepting that the latter must consume more power than the former, to do equal work, at like pressures, by the amount of the additional resistance arising from the contraction of its eduction pipes, in order to produce a fierce blast of steam through the chimney. From these and other causes the fixed non-condensing engine must be the more economical of the two; but if the results derived from M. de Pambour's data be correct, we must acknowledge the fixed non-condensing engine, with its simple atmospheric resistance, to be far inferior in economy of steam to the locomotive, with its plus atmospheric resistance. The experiments by Dr. Lardner were made for the purpose of determining the resistance opposed to progressive motion on railways. They consisted in dismissing trains at various speeds from the summit of inclined planes, and in observing their velocity when it became uniform, the resistance at such velocity being equal to the accelerating force of gravity down the inclined plane. The results of these are tabulated in the same manner as the preceding, and the most singular discrepancies present themselves. For instance, it would appear that in one particular case a duty of double the amount of that effected by the condensing engine was performed by an equal expenditure of power; that compared with a fixed non-condensing engine at equal pressure, the locomotive, though labouring against the heavy counter-pressure of the blast from which the other is free, is assumed to have performed equal work with less than one half the expenditure of power. That if the re-

sistance assigned by Dr. Lardner as opposed to the progressive motion of the train be correct, the efficiency of the steam in the locomotive is more than double that obtained by the best condensing engines; more than treble that derived from stationary non-condensing engines, and equal to the performance of a Cornish expansive engine, doing a 50 million duty with a bushel of coals. With such results before us, the resistance assigned as opposed to and overcome by the locomotive at different velocities, must be regarded as utterly inconsistent with reality, and as resting on no solid foundation.

The preceding results show also that errors have crept in by the adoption of the theoretical method of reducing undulatory surfaces to a level. M. de Pambour extends the length of the road as a compensation for the acclivities or for the help afforded by the bank engines; and Dr. Lardner diminishes the time of the trip to that which he assumes would be occupied in performing it on a dead level. If the principles on which these corrections for the acclivities and declivities are made, be correct, other facts than we are at present acquainted with, must be taken into account before it can be demonstrated that a given power will convey a given load at some certain increased velocity along a level, compared with the actual velocity along any given undulating line. The resistances which enter into the composition of the sum of the forces, are ever varying to such an extent, that it may be doubted whether the theoretical level be not a pure fiction with reference to the practical results of the experiment.

The effective power of a locomotive engine, or the excess of power after overcoming its proper friction and the resistance from the blast, is solely expended in the generation of momentum. This, which is the product of the mass and the velocity, represents the useful mechanical effort exerted by the steam, and may always be ascertained under all the practical circumstances of railway traffic. The consumption of power as water, in the shape of steam, is a third quantity which may also be readily ascertained. The application which may be made of the above

data, is comprehended in the following propositions. First, that equal momenta would result at all velocities, from an equal amount of power expended in equal times, by the same engine, if the forces opposed to progressive motion and to the effective use of steam in the engines, were uniform at all velocities. Secondly, the difference between the momenta generated by a unit of power, in a given time, at various velocities, measures the difference in the sum of the resistances opposed to the power at those velocities. Having ascertained the gross weight of an engine tender and train—their mean velocity—and the expenditure of water as steam during the trip, simple computations will inform us of

1. The mechanical effect realized by a given power at all velocities.

2. The total increase or decrease of resistance at all velocities.

3. The ratios which the increase or decrease of resistance, at different velocities, bear to the ratio of those velocities.

Two other results also follow from the above, and which may be termed the commercial results, viz.—the amount of gross and useful tractive effect realized by an equal expenditure of power at all velocities. The difference between these is a useless quantity, in a practical sense, being the costly waste of power incident to the locomotive functions of the engine and tender, over and above the waste arising from the unascertained and ineffective portion of the whole power required for the blast. The reductions and computations necessary for the exhibition and development of these views, are contained in two tables. They relate to forty-nine experiments, being those already referred to, and those by Mr. N. Wood, on the Great Western, and London and Birmingham Railway, and some others. One of these tables contains the velocity of the engines, the consumption of water as steam, the loads, the absolute momenta per second; the momenta generated by equal power in equal times, viz., by 1 lb. of water as steam, per second; the weights of the gross and useful loads, moved by equal powers, viz., by one cu-

bic foot of water as steam, at the velocity of each experiment, with various other elements. The other table contains a summary of the ratios of the velocities, and of their squares, brought into juxta-position with the ratios of the power expended to produce equal momenta, equal gross, and equal useful effects, by the comparison of pairs of experiments on the engines, given in the preceding table. This table also shews the influence of velocity in the expenditure of power, to produce equal mechanical and equal commercial effects; and the amount of loss attributable to the increase of resistance at the higher velocities. The author discusses, in great detail, the various circumstances of these experiments, and the inferences and practical conclusions which may be deduced therefrom; and comes to the conclusion, that the determination of the performance of locomotive engines, by the methods here set forth, is as practicable, exact, and demonstrative of their relative powers and dynamic excellence, as the determination of duty done by pumping engines.

The intensity of the pressure on the opposite side of the piston, arising from the blast, has been but imperfectly stated. By some, the discharge of the steam has been likened to a jet, and considered continuous.—But an attentive observer can appreciate by his ear that an interval exists between the alternate discharges of steam from the two cylinders. That these jets are periodic, and not continuous, is also distinctly evidenced by the audible pulsations in the chimney, even at the very highest velocities of an engine, and their duration may be measured at lower speeds. Upon this intermittant action of the blast, depend, in a great measure, the resultant pressure against the piston, and the production of a sufficient current of air through the fire, both which effects would be materially changed in intensity, by the substitution of a continuous for a periodic current. The precise duration of the jet or of the time of the steam evacuating the cylinder, can only be determined by direct and careful experiments; but its period may be ascertained within definite limits; for since a single discharge is completed within the time occupied

by the piston in accomplishing a half stroke, and the pauses between two successive discharges are distinctly perceptible, a single blast cannot occupy the fourth part of the time of the revolution of the crank shaft, and very probably does not exceed the eighth part, or the period of a quarter stroke of the piston. Under no circumstances, then, can the pressure from the blast oppose the piston much longer than during one fourth of the stroke. With an active pressure, then, of 30 lbs. per square inch, the mean resistance from the blast would not be greater than 7½ lbs., and with a pressure of 15 lbs., not greater than 3¾ lbs. per square inch, against the pistons. The author then proceeds to cite several observations and experiments made by himself, which are confirmatory of the preceding argument respecting the blast; and he was led conclusively to the fact, that one-fifth of of the power of the engine experimented upon, at working pressures of 20 lbs. and 15 lbs., was absorbed in blowing the fire; and that the escape of the steam from the cylinder was four times swifter than the motion of the piston.

The author lastly treats of the expenditure of power for a given effect by fixed and locomotive non-condensing engines. But few experiments on the expenditure of steam for a given effect, by non-condensing stationary engines, have been made. The relative consumption of fixed condensing and non-condensing engines has been treated of by the late Mr. Charles Sylvester, of Derby, whose knowledge and accurate theoretical analysis of the subject are shewn by the close accordance of his conclusions with the facts established on two engines of these classes at certain working pressures. His conclusion that the relative economy of these engines will be as the quantities of steam consumed, or as 1 to 1·72, at those pressures, is accurately confirmed by the results here recorded. Mr. Sylvester also shewed, that by increasing the pressure upon the same non-condensing, and by enlarging the area of the condensing engine's cylinder and air pump, so as to maintain the steam in it at a uniform pressure per square inch for all loads, the economy of the former

would gradually approach and finally equal that of the latter. The results obtained in the preceding part of the paper furnish numerous comparisons between the locomotive and fixed non-condensing engines, and the consumption of the latter has been used, together with the condensing engine, as the test of the accuracy of the data of resistance assigned to the former by the various analysts. The accurate determination of the expenditure of steam by the same locomotive engine, in which the values of the friction and of the blast pressure were ascertained, admits of the consumption of water as steam for given effects being determined, and thus narrows the grounds of doubt, and establishes more correct data for ascertaining the real resistance opposed to progressive motion on railways. The application of these principles, as borne out by the experiments of the author, and their particular bearing on the experiments which have been the subject of the previous ample and detailed discussion, form the conclusion of Mr. Parkes's series of communications on steam boilers and steam engines.

List of Patents

Granted for Scotland subsequent to 22d April, 1840.

To Orlando Jones, of the City-road, London, for improvements in treating or operating on farinaceous matters, to obtain starch and other products,—and in manufacturing starch.—Sealed May 6th.

Francis Gybbon Spilsbury, of Walsall, chemist; Marie François Catharine Doetzer Corbreux, of Upper Norton street, London; and Alexander Samuel Byrne, of Montague-square,—for improvements in paints or pigments, and vehicles, and in modes of applying paints, pigments, and vehicles.—Sealed May 7th.

Joseph Clinton Robertson, of Fleet-street, London, (communicatad by a foreigner, residing abroad,) an improved method or methods of obtaining mechanical power from electro magnetism, and the engine or engines by which the said power may be made applicable to motive purposes.—Sealed May 7th.

John Wilson, of Liverpool, lecturer on chemistry, for an improvement or improvements in the process or processes of manufacturing the carbonate of soda.—Sealed May 11th.

Antoine Blanc, of Paris, merchant, and Theophile Gervais Bazille, of Rouen, merchant, — now residing at Sabloniere's Hotel, Leicester-square, London, — being a communication from abroad,— for certain improvements in the manufacturing or producing soda and other articles, obtained by or from the decomposition of common salt or chloride of sodium.—Sealed May 11th.

Robert Gill Ransom, of Ipswich, paper-maker, and Samuel Millbourn, of the same place, his foreman, for improvements in the manufacture of paper.—Sealed May 13th.

Thomas Myerscough, of Little Bolton, manager, and William Sykes, of Manchester, machine maker, for certain improvements in the construction of looms for weaving, or producing a new or improved manufacture of fabric; and also in the arrangement of machinery to produce other descriptions of woven goods or fabrics.—Sealed May 13th.

James Knowles, of Little Bolton, coal merchant, for an improved arrangement of apparatus for regulating the supply of water to steam boilers.—Sealed May 13th.

Henry Trewhitt, of Newcastle-on-Tyne, for certain improvements in the fabrication of china or earthenware, and in the machinery applicable thereto.—Sealed May 15th.

William Winsor, of Rathbone-place, London, artists' colourman, for a certain method or certain methods, process or processes, for preparing, preserving, and using colours.--Sealed May 15th.

William Craig, of Glasgow, engineer, and William Douglas Sharp, of Stanley, Perthshire, engineer, for certain improvements in machinery for preparing, spinning, and doubling cotton, flax. wool, and other fibrous substances.—Sealed May 18th.

Alexander Angus Croll, of Greenwich, manufacturing chemist, for certain improvements in the process of manufacturing gas, and in the production of ammoniacal salts.—Sealed May 19th.

John Davidson, salt manufacturer, of Leith Walk, near Edinburgh, for an improvement in the method of preserving salt.—Sealed May 19th.

New Patents

SEALED IN ENGLAND.

1840.

To William Crane Williams, of Long Acre, light-house and lamp manufacturer, and Matthew Samuel Kendrick, also of Long Acre, both in the county of Middlesex, lamp maker, for their invention of certain improvements in lighting, and in lamps.—Sealed 28th April—6 months for inrolment.

John Inkson, of Agar-street, St. James's, in the county of Middlesex, gentleman, for improvements in apparatus for consuming gas, for the purpose of light,—being a communication.—Sealed 30th April—6 months for inrolment.

Orlando Jones, of the City-road, in the county of Middlesex, accountant, for his invention of improvements in treating or operating on farinaceous matters to obtain starch, and other products, and in manufacturing starch.—Sealed 30th April—6 months for inrolment.

William Peirce, of James-place, Hoxton, in the county of Middlesex, Ironmonger, for his invention of improvements in the construction of locks and keys.—Sealed 2nd May—6 months for inrolment.

Arthur Wall, of Bermondsey, in the county of Surrey, surgeon, for his invention of a new composition for the prevention of corrosion in metals, and for other purposes.—Sealed 2nd May—6 months for inrolment.

Thomas Gadd Matthews, of the city of Bristol, merchant, and Robert Leonard, of the same place, merchant, for certain improvements in machinery or apparatus for sawing, rasping, or dividing dye woods, or tanners' bark.—Sealed 5th May—6 months for inrolment.

William Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, patent agent, for an improved apparatus and process for producing sculptured forms, figures, or devices in marble, and other hard substances.—Sealed 5th May—6 months for inrolment.

George Mackay, of Mark-lane, in the city of London, ship broker, for certain improvements in rotatory engines,—being a communication.—Sealed 5th May—6 months for inrolment.

William Beetson, of Brick-lane, Old-street, St. Luke's, in the county of Middlesex, brass-founder and pump manufacturer, for his invention of improvements in stuffing boxes, applicable to water-closets, pumps, and cocks.—Sealed 5th May—6 months for inrolment.

Frank Hills, of Deptford, in the county of Kent, manufacturing chemist, for his invention of certain improvements in the construction of steam boilers and engines, and of locomotive carriages.—Sealed 5th May—6 months for inrolment.

Bernard Aubé, of Coleman-street-buildings, in the city of London, gentleman, for his invention of improvements in the preparation of wool for the manufacture of woollen and other stuffs.—Sealed 7th May—6 months for inrolment

Thomas Walker, of Galashiels, in the county of Selkirk,

mechanic, for his invention of improvements in apparatus applicable to feeding machinery, employed in carding, scribbling, or teazing fibrous materials.—Sealed 7th May, 6 months for inrolment.

Henry Holland, of Darwin-street, Birmingham, in the county of Warwick, umbrella furniture maker, for his invention of improvements in the manufacture of umbrellas and parasols.—Sealed 7th May—6 months for inrolment.

Henry Montague Grover, of Boveney, in the county of Buckingham, clerk, for his invention of an improved method of retarding and stopping railway trains.—Sealed 7th May—6 months for inrolment.

Miles Berry, of the Office for Patents, 66, Chancery-lane, in the County of Middlesex, patent agent, for certain improvements in treating, refining, and purifying oils,—being a communication.—Sealed 9th May—6 months for inrolment.

Auguste Moinau, of Philpott-terrace, Edgeware-road, Paddington, in the county of Middlesex, clock maker, for his invention of certain improvements in the construction of time-keepers.—Sealed 9th May—6 months for inrolment.

Rice Harris, of Birmingham, in the county of Warwick, gentleman, for his invention of certain improvements in cylinders, plates, and blocks, used in printing and embossing. —Sealed 12th May—6 months for inrolment.

George John Newbery, of Cripplegate-buildings, in the city of London, manufacturer, for his invention of certain improvements in rendering silk, cotton, woollen, linen, and other fabrics waterproof.—Sealed 12th May—6 months for inrolment.

Henry Dircks, of Liverpool, in the county of Lancaster, engineer, for his invention of certain improvements in the construction of locomomotive steam engines, and in wheels to be used on rail and other ways, parts of which improvements are applicable to steam engines generally.—Sealed 12th May—6 months for inrolment.

John Davidson, of Leith Walk, near Edinburgh, for his invention of an improvement in the method of preserving salt.—Sealed 12th May—6 months for inrolment.

Peter Bradshaw, of Dean, near Rimbolton, in the county of Bedford, gentleman, for his invention of improvements in dibbling corn and seeds.—Sealed 12th May—6 months for inrolment.

James Walton of Sowerby-bridge, Halifax, in the county of York, cloth dresser and frizer, for his invention of improvements in the manufacture of beds, mattrasses, pillows, cushions, pads, and other articles of a similar nature, and in materials for packing.—Sealed 12th May—6 months for inrolment.

Richard Foote, of Faversham, in the county of Kent, watch maker, for his invention of improvements in alarums. —Sealed 12th May—6 months for inrolment.

John Joseph Mechi, of Leadenhall-street, in the city of London, cutler for his invention of an improved method of lighting buildings.—Sealed 12th May—2 months for inrolment.

Bryan I'Anson Bromwich, of Clifton-on-Tyne, in the county of Worcester, gentleman, for his invention of improvements in stirrup irons.—Sealed 13th May—6 months for inrolment.

Henry Ernest, of Gordon-street, in the county of Middlesex, gentleman, for his invention of certain improvements in the manufacture of machines, usually called beer engines.—Sealed 13th May—6 months for inrolment.

William Hannis Taylor, of Norfolk-street, Strand, in the county of Middlesex, esq., for his invention of certain improvements in the mode of forming or manufacturing staves, shingles, and laths, and the machinery used for that purpose.—Sealed 20th May—6 months for inrolment.

William Bush, of Camberwell, in the county of Surrey, merchant,—for improvements in fire-arms and in cartridges,—being a communication.—Sealed 20th May—6 mgnths for inrolment.

James Buchanan, of Glasgow, merchant, for his invention of certain improvements in the machinery applicable to the preparing, twisting, and spinning; and also in the mode of preparing, twisting, and spinning of hemp, flax, and other fibrous substances; and certain improvements in the mode of applying tar or other preservative to rope and other yarns.—Sealed 22nd May—6 months for inrolment.

James Callard Davies, of College-place, Camden-town, in the county of Middlesex, jeweller, for an improved clock or time-piece.—Sealed 23rd May—6 months for inrolment.

CELESTIAL PHENOMENA, for June, 1840.

D.	H.	M.	
1			Clock after the sun, 2m. 30s.
—			☽ rises 4m. 7s. M.
—			☽ passes mer. 1m. 15s. A.
—			☽ sets 10m. 19s. A.
3			Occul η in Cancri im. 9h. 11m. em. 9h. 58m.
4	1	38	☿ in conj. with ♂ diff. of dec. 0. 26. S.
5			Clock after the sun, 1m. 51s.
—			☽ rises 9h. 43m. M.
—			☽ passes mer. 5h. 7m. A.
—			☽ sets Morn.
		19	☿ in the ascending node.
7	1	17	☽ in □ or first quarter.
8	9	39	♃'s first satt. will em.
8	19	11	♄ in oppo. to the ☉
9	13	47	☿ in Perihelion
10			Clock before the sun, 0m. 55s.
—			☽ rises 4h. 0m. A.
—			☽ passes mer. 8h. 41m. A.
—			☽ sets 0h. 58m. M.
	9	21	☿ in sup. conj. with the ☉
	18	17	Her: in □ with the ☉
11	1	36	♃ in conj. with the ☽ diff. of dec. 6. 19. N.
13	11		☽ in Apogee.
14	3	57	♄ in conj. with the ☽ diff. of dec. 6. 19. N.
	10	2	♃'s third satt. will em.
15	2	49	Ecliptic oppo. or ○ full moon
	11	33	♃'s first satt. will em
	15	16	♀ in conj. with ♂ diff of dec. 0. 46. N.
—			Clock before the sun, 0m. 7s.
—			☽ rises 9h. 26m. A.
—			☽ passes mer. Morn.
—			☽ sets 3h. 9m. M.
17			Mercury R. A. 6h. 18m. dec. 25. 4. N.
—			Venus R. A. 4h. 59m. dec. 22. 22. N.
—			Mars R. A. 4h. 56m. dec. 23. 1. N
—			Vesta R. A. 15h. 27m. dec. 11. 18. S.
—			Juno R. A. 6h. 59m. dec. 14. 56. N.
—			Pallas R. A. 18h. 57m. dec. 22. 33. N.
—			Ceres R. A. 20h. 17m. dec. 27. 14. S.
—			Jupiter R. A. 14h. 29m. dec. 13. 31. S.
—			Saturn R. A. 17h. 8m. dec. 21 23. S.
—			Georg. R. A. 23h. 25m. dec. 4. 32. S.
—			Mercury passes mer. 0h. 35m.
—			Venus passes mer. 23h. 17m.
—			Mars passes mer. 23h. 11m.
—			Jupiter passes mer. 8h. 45m.
—			Saturn passes mer. 11h. 22m.
19	21	45	☿ greatest hel. lat. N.
20			Clock before the sun, 1m. 11s.
—			☽ rises, 11h. 19m. A.
—			☽ passes mer. 3h. 57m. M.
—			☽ sets 8h. 58m. M.
	10	55	♃'s second satt. will em.
	21	48	☉ enters Cancer; Summer commences
21	11	56	♃'s third satt. will im.
	17	32	Her: in conj. with the ☽ diff of dec. 2. 59. S.
22	11	31	☽ in □ or last quarter
23	3	56	☿ in conj. with Juno, diff. of dec. 9. 35. N.
24	20		Her: stationary
25			Vesta in Perihelion.
—			Occul ε in Arietes im. 14h. 50m. em. 15h. 44m.
—			Clock before the sun, 2m. 15s.
—			☽ rises 0h. 12m. M.
—			☽ passes mer. 7h. 47m. M.
—			☽ sets 3h. 43m. A.
	15	10	♀ in the ascending node.
28	2	46	♂ in conj. with the ☽ diff. of dec. 4. 10. S.
		4	☽ in Perigee.
	13	48	♀ in conj. with the ☽ diff. of dec. 4. 14. S.
29	1	59	Ecliptic conj. or ○ new moon
30	13	1	☿ in conj. with the ☽ diff of dec. 0. 49. S.

J. LEWTHWAITE, Rotherhithe.

THE

London

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CONJOINED SERIES.

No. CII.

Recent Patents.

To Charles Hullmandel, *of Great Marlborough-street in the city of Westminster, lithographic printer, for his invention of a new mode of preparing certain surfaces for being corroded with acids, in order to produce patterns and designs for the purpose of certain kinds of printing and transparencies.*—[Sealed 26th March, 1838.]

My invention consists, first, in drawing narrow or broad lines, so as to produce figures or patterns directly on the surfaces of copper, steel, or other metallic or glass plates, or rollers, and without the previous intervention of any resinous or other ground or covering, with a composition or mixture soluble in water, and which mixture, when the plate has been subsequently covered with varnish and steeped in water, will dissolve and rub off with the varnish

which is over it, thus exposing the surfaces which were under the mixture to the action of any acid which may be used to corrode the same; and secondly, in the application of grease to such surfaces as aforesaid, for the purpose of obtaining a reticulated or irregularly exposed portion of the same for the action of such acids as aforesaid, for the purpose of producing shaded figures or patterns as hereinafter explained.

A sheet of parchment, marked A, with a number of specimens, figures, and patterns, accompanies the specification by way of illustration. It must, however, be evident, that from the nature of the specimens, it would be impossible to give any correct graphic representation of them here; but, in order that our readers may have all the information we are enabled to furnish, we publish the specification verbatim, with all the references to the sheet of specimens registered in the Court of Chancery.

Description of the new method.—First, I mix seven parts of a thick solution of gum arabic, (say about the thickness of cream,) with about one part of treacle and a small quantity of the best lamp black to give it a color, and grind them well together; or to speak more accurately, take of treacle, nine grains; gum arabic, in powder, eighteen grains; best lamp black, nine grains; mix with water to the consistency of cream and grind well. The object of the treacle is to hinder the gum from chipping off, which it would otherwise be apt to do from the surface of the metal or glass. With this color and a camel's hair pencil, I draw on the naked surface of the metal or glass, whatever subject, figure, or pattern, is intended, a sketch or tracing of the same having been previously transferred to the surface of the metal or glass by the usual means of tracing paper or otherwise; if, however, straight lines only are required to be produced, the common mathematical

pen and a rule, or a common quill or steel pen may be used, according to the nature of the subject. The specimens Nos. 1, 2, 3, and 4, in sheet A, represent the sort of patterns or figures that may be so drawn as aforesaid. No. 1, being drawn with a camel's hair pencil or brush, and Nos. 2, and 3, with both a common quill and mathematical steel pen; No. 4, being drawn with both a camel's hair brush and mathematical pen.

The pattern or design being thus completed in outline, a varnish must either be poured on the plate or else spread on with a flat brush, so as to lay perfectly even on the surface. If the pattern or design has been executed on a cylinder or roller, an axis or spindle must be fitted to the roller, and the whole fixed on to a stand, so as to turn by means of a handle or otherwise, and the varnish being laid on with a flat brush over the whole surface of the roller or cylinder, it should be turned round on its axis with a slow and even motion, until the varnish has spread evenly over its whole surface and is set. I lay no claim to any peculiar varnish; but I prefer for this part of the process, a mixture of four or five parts of what is called in Paris, "petit vernis," and one part of what is commonly sold in London, under the name of Brunswick black; the surfaces of the metal or glass with the designs upon them being thus coated, the varnish must be allowed to dry for twenty-four hours, when the plate or cylinder, as the case may be, must be steeped in water for two or three hours, and afterwards by gently rubbing the surface with a soft hair pencil or a sponge, the varnish will leave the metal wherever the mixture above-mentioned of gum and lamp black has been previously applied, as well as the said mixture itself; and that part of the surface, which is intended to produce the pattern or design, will be left completely uncovered, and prepared for being bitten or

corroded to the depth required, by such acid as is usually employed for biting or corroding, according as metal or glass has been used, in which latter case, fluoric will of course be the proper acid. The parts thus exposed as aforesaid, having been sufficiently corroded or bitten, the varnish must be removed with spirits of turpentine in the usual manner, and the surface well cleaned.

The second part of my said invention is, preparing the said surfaces for biting in the shadows for the pattern or design, obtained in outline, as before described. For this purpose I take a very small quantity of tallow, or grease of any kind, on a rag or a piece of wash leather on the tip of the finger, and rub the surface of the plate or roller with it, so as to grease it all over slightly, though perceptibly; this done, the said surface must be rubbed with a dry soft cloth or rag, and this operation of rubbing with a rag must be repeated two or three times, until the surface of the metal appears to be well wiped, and no visible grease left, though, in fact, there must be a greasy coating over the whole surface.

A mixture of a solution of equal parts of gum arabic and gum tragacanth must then be prepared, to which solution, treacle must be added in the proportion of one part of treacle to five parts of the solution, and the whole well ground with a small quantity of good lamp black or any other coloring material, merely to give it a color; or to speak more correctly, take of powdered gum arabic, twelve grains; powdered gum tragacanth, seven grains; put these in solution in a little water for two days, and then add treacle, nine grains; best lamp black, ten grains; and grind all well together. On applying some of this colored solution with a camel's hair pencil to the surface prepared with grease as aforesaid, the solution will retract or withdraw itself into reticulated or irregular forms, or a

sort of net work, as exhibited in specimen No. 5, which shews the effect produced by merely dabbing or drawing a brush containing the mixture over the prepared greasy surface of the plate, by which means, if laid on in an artist-like manner, forms and shading can be produced with the greatest ease and rapidity, as shewn by the specimen or shaded pattern specimen No. 6, which is the same figure as specimen No. 1, with the shading added thereto. Specimens 7, 8, and 9, also shew the effect produced by the novel kind of shading in different figures or designs. Specimen No. 10, shews the same effect of shading, the design or pattern being on a dark ground, produced by dipping a small piece of soft sponge in the ink or mixture, and dabbing it upon the prepared greasy surface; or the same effect may be produced by a dabber, commonly used by engravers in laying on etching ground, the dabber being covered with soft wash leather, and dipped in the ink, and applied to the surface of the metal, plate, or cylinder. The closeness or openness of this net-work or shading can be modified by using the color thicker or thinner.

By this second method of preparing the surfaces, it is evident, that original figures, patterns, or designs, may be executed, or else it may be used to produce shadings to the patterns previously designed or corroded by the first-mentioned process. In the case of designs and patterns for printing on silk, cotton, or woollen fabrics, these may be either wholly produced by one or other, or both of the methods before given, or part of the patterns or designs may be executed by the methods already in use, and the shading produced by the second part of my said invention hereinbefore described. The design or pattern being completed by shading as aforesaid, the varnish is laid on

as already explained, for the first part of my said invention, and the parts which are intended to be corroded or bitten, uncovered by again steeping the plates or rollers in water, and gently rubbing as before mentioned.

When the pattern is small and often repeated, as shewn in specimens Nos. 11, 12, and 13, it can be executed in wood in the ordinary manner of block printing, or in metal; and by charging the pattern thus carved or engraved with the aforesaid gum and lamp black, and fine sand, which are to be mixed in about the following proportions:—gum arabic in powder, forty grains; best lamp black, six grains; very fine sifted sand, fifty grains; or else gum arabic, forty grains; lamp black, six grains; powdered pumice stone, sixty grains: this ink must be very slightly ground. In the first recipe the lamp black and gum in solution must be ground together, and the sand added afterwards. The plates or blocks being charged with the mixture in the same way that a wood block or engraving is charged for printing on calico or paper, the small design may be repeated on the naked surface of the metal or glass as often as is required, the whole being then covered with varnish, afterwards soaked in water, and corroded with acid as before described.

Now whereas, it is evident, that patterns and designs may be produced by the use of either the first or second part of my said invention, as well as by both combined, and that clean, even black lines, may be produced on the greased surface by the addition of a little gall to the gum solution, as well as on the bare surface of the metal or glass, the Nos. 11, 12, and 13, being specimens of the several styles.

And whereas, I do not claim as my invention the use of any peculiar varnish, or of any peculiar solution or

coloring matter for the purposes aforesaid; but I do claim, first, the application of these materials, mixed in manner aforesaid, directly on the bare surface of metal or glass plates or rollers, as hereinbefore explained, with reference to the first part of my said invention; and then varnishing and steeping the said plates or rollers in water, and rubbing off part of the said materials as aforesaid, and thus preparing the said surfaces, to be corroded or bitten with acid, so as to produce patterns and designs as aforesaid, for the purposes aforesaid.

And secondly, I claim the preparing of surfaces of metal or glass by greasing them as hereinbefore described, so as to produce a sort of net work, or irregular marks, shading, patterns, or designs, for the purpose aforesaid, when drawn upon in manner aforesaid, and afterwards varnished, steeped, and rubbed, as explained in the second part of my said invention.

And such, my said invention, being to the best of my knowledge and belief, entirely new and never before used within that part of Her said Majesty's United Kingdom of Great Britain and Ireland, called England, Her said Dominion of Wales and Town of Berwick-upon-Tweed, and in all Her Majesty's colonies and plantations abroad,—I do hereby declare this to be my specification of the same, and that I do verily believe this my said specification doth comply, in all respects, fully and without reserve or disguise, with the proviso in the said hereinbefore in part recited letters patent contained; wherefore I do hereby claim to maintain exclusive right and privilege to my said invention.—[*Inrolled in the Rolls Chapel Office, September*, 1838.]

To Joshua Wordsworth, *of Leeds, in the county of York, machine-maker, for certain improvements in machinery for heckling and dressing flax, hemp, and other fibrous substances.*—[Sealed 17th November, 1838.]

My invention of improvements in machinery for heckling and dressing flax, hemp, and other fibrous materials, consists in a peculiar arrangement of mechanism, in which a consecutive series of stricks of flax are progressively carried through the machine, and in their passage are continually acted upon by the points of a double series of endless sheets of revolving or travelling heckles; the larger points, or more open heckles, commencing the operation, which are followed by closer and finer points, until the heckling operation is completed; and the tow, drawn off from the flax in the process of heckling, is transferred from the points of the heckles on to a doffing cylinder, covered with cards or pointed wires, by the agency of a brush roller.

This arrangement of apparatus will be more fully understood by reference to the accompanying drawing, and the following description thereof, in which similar letters indicate corresponding parts in all the figures.

Fig. 1, Plate XIII., is a front or longitudinal elevation of the machine; fig. 2, an end view of the same; and fig. 3, a vertical section, taken transversely through the machine, about the middle of fig. 1.

Stricks of flax *a, a, a,* are confined in pairs of clamps or holders *b, b, b,* screwed together in the ordinary way.—These clamps, with the stricks, are severally placed upon the inclined plane of the guide rails *c, c,* down which they successively slide, and are pushed forward through the machine upon the guide rails *c, c,* by the rotary curved arms *d, d, d.* The heckles *e, e, e,* &c., are fixed upon

semi-cylindrical rods, placed longitudinally through the operating parts of the machine; and these rods are connected together in a back and front series, by endless bands of leather *f*, *f*, *f*, *f*, extending over the carrying rollers *g*, *g*, *g*, *g*. Semi-cylindrical grooves are formed along these carrying rollers *g*, for the reception of the rods of the heckle bands; and hence, as the rollers *g*, revolve, the endless bands, and the heckles, will be made to revolve also, carrying the points of the heckles downward through the stricks of flax.

As the holders, with the stricks of flax, slide down the inclined planes of the guide rail *c*, *c*, the lower ends only of the pendant flax will be first operated upon by the heckles; but, as the holders advance, descending down the inclined plane, the heckle points will be enabled to take into the strick of flax higher up, until the holders having arrived at the horizontal part of the guide rails, the strick will have descended to its lowest position, and the heckles will then pass through the whole length of the pendant strick, and continue to heckle or comb the fibres of the flax quite through, until the strick is discharged, in a finished state, at the left-hand end of the machine, fig. 1; observing, that the heckle points, at the right-hand end of the machine, which commence the operation, should be larger, and placed farther apart than those points which finish the operation of heckling the strick.

The tow collected upon the points of the heckles, as they come down from the pendant flax, is taken off the points by the brushes *i*, *i*, *i*, of a revolving brush cylinder *h*, *h*, at the back of each endless band of heckles; and as these brush cylinders revolve, the tow is transferred from the brushes *i*, on to the surfaces of the card cylinder *k*, *k*, whence the tow is removed by the vibrating doffer combs *l*, *l*, and let fall into boxes *m*, *m*, ready to be taken to a

carding engine, to be operated upon, as tow usually is, preparatory to spinning it into tow yarn.

Having now described the construction of my improved machine, it only remains to shew the manner in which the several parts are actuated. At the left-hand end of the machine, fig. 1, *n*, and *o*, are the fast and loose riggers or pullies, over which a band is extended from the rotary part of a steam-engine, or other first mover. The pulley *n*, is fixed upon the end of the shaft of one of the lower carrying rollers *g*, which consequently becomes the first driving shaft in the machine. Upon this shaft, a toothed wheel *p*, is affixed, taking into a corresponding toothed wheel *q*, on the shaft of the other lower carrying roller; hence, the rotation of the one shaft drives the other, and gives the rotary or travelling motion to the endless sheets of heckles.

A toothed wheel *r*, is fixed upon the axle of each of the brush rollers, which, respectively, take into the teeth of the wheels *p*, or *q*; and by the rotations of those wheels, the rotary motions of the brush rollers are obtained.

Cranks and rods *s*, *s*, connected to the shafts of the lower carrying rollers *g*, work the doffer combs *l*, *l*, whilst the rotary motions of the card cylinders *k*, are obtained by a pinion on the shaft of each of the brush rollers at the reverse end of the machine, taking into a train of wheels and pinions connected with the shafts of the card cylinders.

The relative diameters of these wheels and pinions must vary, according to the quality of the flax, and the quantity of the tow produced.

The rotary motion of the driving arms *d*, *d*, *d*, which impel the holders, with the stricks of flax, through the machine, is obtained by a pinion *t*, on the shaft of one of the upper carrying rollers *g*, which pinion takes into a wheel *u*, turning upon a stud, fixed in a slot plate, on the end frame of the machine, (see fig. 2); and upon the side

of this wheel a pulley *v*, is affixed, from whence a band passes to a pulley wheel *w*, turning upon a stud *x*, attached to the upper part of the same end frame.

Upon the socket of the pulley wheel *w*, there is a pinion *y*, which takes into a wheel *z*, on the axle of the rotary driving arms *d*, *d*, *d*, as shewn in figs. 1 and 2; the diameter of which pinion and wheel may vary according to the quantity of dressing required by the flax under operation.

It will now be perceived by what means the rotary motion of the upper carrying roller *g*, produces the rotation of the driving arms *d*, which causes the holders, with the stricks of flax, to be impelled forward through the machine.

It is only to be added, that as fast as the stricks are supplied upon the guide rails, by the persons attending, who fill the holders, they are pushed forward by the rotation of the bent arms, and each strick having passed to the opposite end of the guide rails, is there delivered, and may then be reversed in the holder, and again introduced into the machine, as before, for the purpose of dressing the reverse ends of the flax.—[*Inrolled in the Rolls Chapel Office, November*, 1838.]

Specification drawn by Messrs. Newton and Berry.

To Henry Seymour Moore Vandeleur, *of Kilrush, Ireland, for improvements in paving or covering roads and other ways.*—[Sealed 16th December, 1839.]

This invention is described, in the patentee's words, "as consisting in forming or shaping two surfaces of each block to angular figures; the angles of the different blocks being produced by radial lines from a point distant from the

under side of the surface of the road or other paved way; such angles not running from the bottom to the top of the blocks, but only running partly up the block; the part of the side surfaces being produced by radiating lines from a point above, and the lower side surfaces from a point situated below the surface of the road or way."

The patentee does not confine hinself to the exact distance that the points of radiation shall be situated above and below the surface, but prefers one-seventh the width of the road as the best distance.

Plate XIV., fig. 1, is a diagram, representing the manner of obtaining the requisite slope for the blocks. *a*, is the radiating point for the angle of the lower sides of the blocks, and *b*, the radiating point for the angles of the upper sides. This figure also shews a number of the blocks placed together, so as to form part of a road-way. In this figure it will be seen that the upper and lower sides of the blocks are both the same length, but they may be made of different lengths, as seen in fig. 2,—the slope or angle being given in the same manner as in fig. 1.

Another method of forming blocks of wood for paving will be understood by referring to figs. 3 and 4. In this method the blocks are of a rectangular form, and have notches or grooves cut out of their corners, as in fig. 3, for the purpose of receiving a small tie-block, which serves as a supporter.

It will be seen, upon referring to fig. 4, which represents a plan view of part of a road-way, constructed in this manner, that the blocks are all tied or held together, so that no one block can sink without bringing several of the others with it.—[*Inrolled in the Inrolment Office, June, 1840.*]

To Daniel Ramee, *of Charlotte-street, Bloomsbury, for improvements in paving roads, and such like ways,—being a communication from a foreigner, residing abroad.*—[Sealed 15th July, 1839.]

This invention relates to paving streets, roads, and ways, either with wood or stone; the particular shape of the block does not, however, constitute any part of the improvements claimed by the patentee. The invention specified may be divided into two parts; the first part is described as an improved method of binding together the materials of which the road or way is composed; and the second part is for constructing sub-ways, through which gas and water-pipes may pass, such sub-ways being in communication with the atmosphere above, so that any escape of gas or water may be easily detected; and the exact situation and position of such escape determined without the necessity of pulling up the road-way.

The first part of the invention will be better understood by referring to Plate XIV., in which fig. 1, is a plan view of a cast or wrought iron frame, intended to be filled with blocks of stone or wood of any convenient shape or size;—the framing consists of bars of iron, strongly bolted together by wedges, which are knocked or forced in tight, when the frame is filled with stones. Fig. 2, is a perspective view of another method of forming or constructing masses of stone or wood to be composed of smaller blocks; by this method, four or more blocks of stone or wood are bound together with ligatures *a, a,* and the whole is held tight by forcing wedges down the grooves *b, b,* made in the blocks for that purpose. Sometimes when the iron framing is used, the blocks of stone contained therein are tightened by wedge-formed border stones, which being

forced down among the other blocks, press them tightly and closely together.

The second improvement consists in forming or constructing sub-ways, which are in communication with the atmosphere above. This part of the invention is illustrated at figs. 3, and 4. Fig. 3, is a section of part of a roadway. *a, a,* is the roadway constructed either according to the former part of the invention, or in any other convenient manner; *b, b, b, b,* is the sub-way, built of brick in the ordinary manner, and divided off into chambers by partitions *c, c,* which are made air and water tight, and placed at certain distances apart, say ten or twelve feet; each chamber communicates with the atmosphere above by means of an iron pipe or tube *d,* open at both ends, or perhaps temporarily closed at the upper end, in any convenient manner, to prevent drift or other extraneous matters from choking it up. The pipe or tube *d,* is attached at its upper end to one particular block, as seen at fig. 4.

The claim of invention at the conclusion of the specification, is in the following words: "I claim, firstly, binding together the materials of which the surface of the road or way is composed, in masses, with wedging frames, or ligatures and wedges, as hereinbefore described; secondly, wedging those masses together with wedge-formed border stones, as hereinbefore described; and thirdly, using pierced stones, provided with tubes or pipes, to form a communication with the atmosphere above the surface of the road or way, and the gas and water pipes below the surface of the road or way, as hereinbefore described.—[*Inrolled in the Inrolment Office, January,* 1840.]

To JOHN BROWNE, *of Castle-street, Oxford-street, Esq., for his invention of improvements in paving roads and streets.*—[Sealed 8th November, 1838.]

THIS invention relates to paving streets, roads, and ways, either with wood or stone, and consists in placing or arranging the blocks in cast or wrought iron frames, which support a certain number of them, and prevent them from sinking into the substratum.

Plate XIV., fig. 1, represents a transverse section, taken through a road constructed according to this plan; and fig. 2, is a plan view of one of the frames, shewing the method of arranging the blocks therein.

A smooth and even surface must be first prepared, and frames which are made to assume the required curve of the road, are filled with blocks of wood or stone, and are dowelled, pinned, or otherwise fastened together, so as to make one frame assist in supporting the one next to it, and prevent it from sinking below the proper level; as the road would soon become impaired by the shocks that the sunken part would receive from carriages passing over it, if any part were to sink below the proper level.—[*Inrolled in the Inrolment Office, May,* 1839.]

To ROBERT CAREY, *of Breadgear, near Sittingbourne, in the county of Kent, gentleman, for certain improvements in paving or covering streets, roads, or other ways.*—[Sealed 29th January, 1839.]

THIS invention is for using wooden or stone blocks of a particular shape, so that they may be enabled to support

one another. The shape used by the patentee is represented in Plate XIV., at fig. 1, which is a side view or elevation of three or four blocks, put together in the same way as they would be on a roadway. Fig. 2, is a plan view of fig. 1.

It will be seen, that each separate block both supports and is supported by all those with which it is in contact, so that upon a weight being placed upon any particular block, the four surrounding blocks each assist in supporting the same, as, indeed, do all the other blocks for a considerable distance round, because it is impossible for any block to sink with carrying down four others with it; and these others are, in their turns, supported by such other blocks as they may be in contact with. It will, therefore, be evident, that the strength necessary to support any weight, will be obtained from all the surrounding blocks.

The claim of invention is constructing blocks of wood, which, when placed together and accurately fitted, shall alternately present a concave and convex form, as seen in the drawing, and thereby tending to support each other.

This appears to us to be the best description of wood paving yet offered to the public, and would be the most likely to meet with encouragement, if any economical method could be devised for cutting or forming the blocks with correctness.—[*Inrolled in the Inrolment Office, July, 1839.*]

To DAVID STEAD, *of Great Winchester-street, London, merchant, for an improved mode or method of making or paving public streets and highways, and public and private roads, paths, courts, and bridges, with timber or wooden blocks.*—[Sealed 28th April, 1839.]

MR. STEAD has shewn a great deal of ingenuity in his specification, as he has presented us with drawings of blocks of wood in almost every possible variety of shape.

In Plate XIV., there are views of several different shapes of blocks; most of them are however upon the principle of Carey's patent, viz., each block is supported by the surrounding ones.

Fig. 1, is a side view or section of one description of block, several being ranged side by side in the manner they would be placed in a road. The block *a*, is supposed to be the end one of the row, or that which is nearest the curb stone; one side, therefore, is made flat, and the other side has a ledge or tennon formed on it to support the next block *b*, which has a projection, formed on one side, to fit on to the ledge or tennon of the first block, and a ledge or tennon on the other to support the block *c*; and as the other blocks, composing the road, are similarly made, it will be evident that no one block can sink without pulling down the others with which it is in contact; and as the whole are connected together, in the manner above described, the road supports its own weight, and that of any body that may be placed upon it.

Fig. 2, is a view of three or four other shaped blocks, connected together. One or two of the shapes shewn, seem to us to interfere with Mr. Carey's invention, as they are made alternately concave and convex, and are also made

to fit in and support one another in the same manner as Mr. Carey has described his system.

Another form of block is represented at fig. 3, which is a plan view of two blocks, connected together; fig. 4, being a side view of the same. This block resembles two oblong blocks, placed crosswise, having the four ends of the two blocks projecting to form the ledges and projections corresponding to the ledges and projections in fig. 1. Fig. 5, represents a peculiar arrangement of hexagonal blocks, such as described in patentee's former specification, dated November 18th, 1838; and it consists in having two courses of blocks of the hexagonal shape, each course arranged in such a manner that the junctions of one course (say the under) may come beneath the centre of the upper, so that no one block of the upper course can sink without displacing three of the under ones; this will be easily understood by referring to the figure, in which the upper course of blocks is drawn in lines, and the under in dots, to distinguish them.

There are other shapes shewn in the specification, but they do not appear to us to be of sufficient importance to render a detailed description and drawing necessary.—[*Inrolled in the Inrolment Office, October,* 1839.]

To Stephen Geary, *of Hamilton-place, King's-cross, architect, for certain improvements in paving or covering streets, roads, and other ways,— being a communication from a foreigner residing abroad.*—[Sealed 1st June, 1839.]

The specification of this invention is (or perhaps we ought rather to say appears to be) an ingenious compilation of the

two former of Messrs. Carey and Stead. The similarity of the present invention to those of the above-named gentlemen, was so apparent to us, that upon the first glance we took at the drawing, without referring to the description, we supposed that Mr. Geary had made sketches of the several schemes proposed by his predecessors, in order to point out the difference between them and his own. We were however soon undeceived, as Mr. Geary claims, one after the other, nearly every form of block proposed and described by the other patentees.

One of the forms shewn, was that described in our report of Carey's patent, of the concave and convex, alternately arranged; another was that described in the report of Stead's specification, at fig. 1. This form of block Mr. Geary has arranged in the form of an arch, as seen at fig. 1, Plate XIV., for the purpose of carrying railways over roads or canals. A slight alteration of the above-mentioned block is shewn at fig. 2, in which the blocks are made to assume a slanting, instead of the vertical direction, as in Stead's; a pyramidical block *a*, upon which the others bear, is placed in the centre of the road.

Another form is shewn at fig. 3.—This consists of pyramidical shaped blocks, arranged with the apex alternately upwards and downwards;—rebates or tennons are formed on some of the blocks, as seen at *b*, *b*. There is one other modification which seems to possess some degree of novelty; we should however imagine that the expence of cutting or forming the blocks of this shape, would far outweigh any advantages that might arise from the peculiarity of construction.

Fig. 4, is a plan view of part of a roadway, constructed with blocks of the form alluded to, and which in plan somewhat resembles the letter T. Fig. 5, is a perspective

view of one of the blocks, and shews the wedge shaped form in which it is made.

One of the *novelties* claimed, is having two courses—an upper and under course of blocks,—in the same manner as described in Mr. Stead's specification. There are several other forms of blocks shewn (upwards of twenty) but they are all so closely resembling Messrs. Stead's and Carey's inventions, that we do not consider it necessary to give any detailed description of them.—[*Inrolled in the Inrolment Office, December,* 1839.]

To RICHARD HODGSON, *of Salisbury-street, Strand, gentleman, for improvements in the forms or shapes of materials and substances used for building and paving, and in their combination for such purposes,—being a communication from abroad.*—[Sealed 27th June, 1839.]

THE object of this invention is for effecting the following improvements in building and paving:—Firstly, the formation of a horizontal platform without the aid of an arch; secondly, forming a horizontal platform, which will supersede the use of an arch. This object is effected by adopting a peculiar but simple and regular form of construction, all the blocks or materials being of the same shape, the weight or pressure acting equally and perpendicularly upon each block or stone.

It is here stated, that "to construct horizontal platforms by means of arches, and by the only method hitherto known, all the blocks must be of different forms and inclinations, according to the situation in which they are to be placed, the pressure being lateral and dependent upon the key-stones and abutments only."

If the inventor had taken the trouble of reading the three foregoing specifications, he would perhaps have come to a different conclusion, as a platform may be constructed upon the principle of either, without the aid of an arch.

The third object to be effected by this invention, is an improved method of constructing buildings in general, that is, instead of forming all the materials in a perpendicular and rectangular shape, the same result is obtained by producing the perpendicular equilibrium and external rectangular shape, all the materials or component parts being formed of an acute angle; such angle being determined by precise and fixed rules.

The invention, in fact, consists in forming or shaping the materials, according to a new section of the cube. The angle at which the cube is cut, to form the blocks, is about 63 degrees, and the mode of ascertaining and forming this angle with accuracy, and upon which the success of the invention in a great measure depends, is to draw a square, (see Plate XIV. fig. 1, representing one side of a cube,) and to divide the upper side into two equal parts, and from the point of division 1, draw an oblique line to the extreme point 2, of the right-hand, at the bottom of the square; then divide the bottom of the square in the same manner; and from the left-hand top corner 3, of the square, draw a line down to the point of division 4, of the bottom; then take another square, representing the back part of the cube, and draw two parallel lines, but in the inverse or contrary manner, as seen at fig. 2.

The shape of the blocks, intended to be used, is shewn at fig. 3, and another shape is also represented at fig. 4. These figures represent the blocks complete, or just as they should be used.

The sides of the triangular-shaped block, fig. 4, are shaped to exactly the same angle as that shewn at fig. 3,

(see fig. 5 and 6); and these blocks may either be made out of one single piece of wood, or they may be made of two pieces, of the shape shewn at figs. 1, 2, 5, and 6, and afterwards joined together with pegs. Fig. 7, represents part of a roadway, constructed with blocks, of the shape shewn in Fig. 3.

The patentee says, in conclusion,—"having now described the nature of the invention, and the manner in which the same is to be carried into execution, I would have it understood, that I claim, first, the mode of forming or shaping materials or substances for paving and other purposes, according to the division of the cube herein described; and secondly, the mode of employing, in combination, for building, paving, and other purposes, blocks, materials, or substances, so formed or shaped."—[*Inrolled in the Inrolment Office, December*, 1839.]

To ROBERT SMITH, *of Manchester, in the county of Lancaster, engineer, for his invention of certain improvements in the means of connecting metallic plates for the construction of boilers, and other purposes.*—[Sealed 16th February, 1837.]

MY improvements in the means of connecting metallic plates, for the construction of boilers and other purposes, consist in the employment of certain machinery for connecting the plates by compression, that is, compressing the ends of the studs or rivets by dies instead of the ordinary manner of rivetting by means of the hammer, and by manual labour.

The apparatus which I have adapted to effect this object is evidently capable of much variation as to form and magnitude, and of some modifications in the arrangement and construction of its parts.

I have exhibited in the drawing, (see Plate XIII.,) several views of a machine capable of performing the operation of rivetting plates together in a very complete manner; and the form and arrangement there set out, I have found sufficiently convenient and effective.

Fig. 1, represents a side elevation of a machine, adapted to the purpose of connecting plates of iron or other metal, by compressing the ends of short pieces of cylindrical rods which form the rivets; fig. 2, is a vertical section, taken longitudinally through the middle of the machine; and fig. 3, is a horizontal view of the same, taken on the upper side. Similar letters of reference are marked upon corresponding parts of the machine in all these figures.

The frame-work, or main casting of the machine, is shewn at *a, a, a,* which is to be bolted down to foundation stones, or otherwise firmly secured to the ground. A right-angled lever *f,* of the first order, is mounted upon a fulcrum pin or axle *h, h,* inserted into the side frames; the shorter arm of which lever acts upon one of the punches or dies *k*; and a straight lever *g,* also of the first order, is mounted upon a similar fulcrum pin or axle *h,* likewise inserted into the side frames, its shorter arm acting upon the other punch or die *k.* A rotary shaft *b,* turning in plummer blocks attached to the frame-work, carries the cam *d,* which acts against the tail or longer arm of the lever *f,* for the purpose of projecting the die *k*; and another rotary shaft *c,* similarly mounted, carries the cam *e,* which acts against the longer arm of the lever *g,* for the purpose of working the other die *k.*

The driving power is applied by means of a band and pulley *l,* or otherwise to the shaft *n,* which shaft carries a pinion *m,* that takes into a wheel *o,* fixed on the cam shaft *b*; and this driving power is communicated through an intermediate wheel *p,* to a corresponding wheel *j,* fixed on the other cam shaft *c.*

The punches or dies *k*, *k*, slide in sockets, formed in the front part of the frame-work, as represented in the sectional figure 2; and they are respectively connected to the levers *f*, and *g*, by straps *i*, *i*.

Two plates of metal A, and B, having been previously punched or pierced with corresponding holes, are introduced between the dies, and held in the proper positions, as shewn in figs. 1, 2, and 3,—a small pin or rivetting stud is then passed through the corresponding holes in the two plates, and the positions of the plates adjusted, so that the ends of the rivetting stud shall stand opposite to the two dies *k*, *k*, ready to be compressed by them when the levers *f*, and *g*, are put in action.

Rotary motion being now applied, as described, to the shafts *b*, and *c*, the cams *d*, and *e*, cause the lever *f*, and *g*, to act simultaneously in bringing the dies *k*, *k*, towards each other, by which means the ends of the metal pin or rivetting stud are compressed and spread out upon the plates in form of rivets of a spherical, conical, or other protuberant shape, according to the counter-sunk figure of the dies; and the plates thus become closely and firmly attached or rivetted together,—the operation of perfectly rivetting each stud by compression being effected by one rotation of the shafts and cams, as described.

After one rivet has been thus formed, the plates have to be advanced in a lateral direction for the purpose of bringing the next pair of holes, with the rivetting pin, into the same situation between the dies;—this is effected by the agency of a pair of conducting rollers *q*, *r*. These rollers are fixed upon perpendicular shafts *x*, *x*, which are inserted into cylindrical holes in the frame-work, and turn loosely therein, as shewn in fig. 2. They are placed parallel to each other, and the studs or pins, round the periphery of the spur roller *q*, pass into a groove, formed round

the periphery of the roller *r*. The shafts *x*, *x*, are adjustable by means of screw-nuts or collars *y*, *y*, in order that the rollers *q*, *r*, may be brought into coincidence, and raised or depressed according to the breadth of the plates intended to be operated upon. On the shaft of the spur roller *q*, a ratchet wheel *w*, is fixed, which is acted upon by a click *v*, attached by a swivel joint to a weighted lever *u*, *u*. The parts are represented in the elevation, fig. 1, and also in the detached horizontal view, fig. 5.

Upon the end of the shaft *c*, an excentric cam is fixed, which acts upon the tail of the lever *w*; and when the lesser radius of the cam comes round, the lever, by its gravity, falls towards a perpendicular position, and causes the click to drive the ratchet wheel one tooth, which turns the spur roller and causes it to advance the plates one hole, thereby bringing the next rivet under the operation of the dies.

I have shewn in fig. 4, a variation of the machinery I have employed, for the purpose of connecting metallic plates, as above proposed, and in this figure it will be seen that I have made one of the dies *k*, stationary, and am consequently enabled to perform all the necessary evolutions of the machine without the aid of the wheel *p*, and the one into which it gears upon the shaft *c*, also without the cam *e*, lever *g*, and pin *n*; communicating the rotary motion to the cam *s*, by means of bevel wheels and the diagonal shaft *z*; and as this arrangement of the machine will be the simpler of the two, it may be found to perform the necessary operation with equal success.

It will be found, by practical observation, that boilers and other vessels, the plates of which have been connected by the means I have described, are much more firmly united, and consequently more capable of resistance than those which have been rivetted in the ordinary manner by

hand, and that the rivets so produced have a much more finished appearance and regularity of form than can be obtained by the ordinary strokes of the hammer, whilst the saving of time consumed in the operation is as ten to one.

Having now described the mode of carrying my invention into practical effect, and having at the same time shewn and described two modifications of the construction of the machine I would employ for this purpose, it only remains for me to add, that I do not intend to confine myself to any precise form or construction of the machine or apparatus employed, as it must be evident that it is capable of much mechanical variation, by different arrangement of the parts of which it may be composed; nor shall I confine myself to the dimensions of the same; but I claim, as my invention, the manner of connecting metallic plates for the construction of boilers and other purposes, by rivetting them together by compression, obtained by the aid of machinery, constructed upon the principles shewn in the accompanying drawings, whatever variation in form or dimensions it may receive.—[*Inrolled in the Rolls Chapel Office, August,* 1837.]

Specification drawn by Messrs. Newton and Berry.

To JOHN DICKENSON, *of Bedford-row, Holborn, in the county of Middlesex, Esquire, for his invention of certain improvements in the manufacture of paper.*— [Sealed 17th October, 1839.]

THE present invention is not for any improvement in the manufacture of paper, but merely for the introducing of of certain fine threads or lines of silk into the fabric, to prevent the forgery of postage envelopes. It is proposed to introduce four threads, two of which will be situated

very near the surface of one side of the paper, and the remaining two just beneath the surface of the opposite side.

The diagram in Plate XIII., will serve to shew the manner in which this object is effected. The pulp cylinder *a*, is mounted in the pulp vat *b*, *b*, and as it revolves it draws from the reels *c*, and *d*, lines or threads, or silk, which may, if required, be of different colours.

As the threads come into contact with the paper cylinder, at different points, one thread touching the cylinder before the point of contact enters the pulp, and the other thread coming into contact with the cylinder when the paper is partially formed thereon, it will be evident that the two threads will be incorporated with the paper at different thicknesses; or in other words, that the thread which comes into contact with the cylinder before the point of contact enters the pulp, will be very near the surface of the paper; while the other thread, which does not contact until the paper has become partially formed on the cylinder, will be more deeply incorporated with the paper, or will appear on the other side.—[*Inrolled in the Rolls Chapel Office, April*, 1840.]

To James Stevenson, *of Leith, merchant, and* John Ruthven, *of Edinburgh, mechanician, for their invention of a method of cutting wood by certain improved instruments.*—[Sealed 28th April, 1835.]

Instead of employing circular or longitudinal saws, of the ordinary construction, for the purpose of cutting wood, the patentee has invented an improved instrument, which consists of a circular disc of steel or iron, having sockets formed round its periphery for the purpose of receiving the cutting

tools, which are thin pieces of steel similar to chisels, and ground to a fine edge. Upon rotary motion being communicated to this circular disc of iron, the chisels, which are fixed in the sockets, cut the wood away without wasting any in saw-dust, as is the case with common circular saws. These small tools or chisels may be adapted to a longitudinal piece of thin iron, so as to form a long saw, if required.

The claim of invention is for using tools of the above description for cutting wood, in place of the teeth of a common saw.—[*Inrolled in the Rolls Chapel Office, October*, 1835.]

To JOSEPH SKINNER, *of Fen-court, in the city of London, civil engineer, for his invention of certain improvements in machinery for cutting wood for veneers and other purposes.*—[Sealed 29th December, 1835.]

THE wood is cut by a stationary longitudinal knife, against which, the block of timber is pressed by what the patentee calls a compressing edge or roller, and the thickness of the veneer is regulated by two upright screws, which cause the block to descend to the amount of the required thickness of the veneer, after the knife has cut off one thickness.—[*Inrolled in the Inrolment Office, June*, 1835.]

To Charles François Edouard Aulas, *of* 38, *Grande Rue Verte, Paris, in the Kingdom of France, but now residing in Cockspur-street, in the county of Middlesex, gentleman,—for a new and improved method of cutting and working wood by machinery,—being a communication from abroad.*—[Sealed 7th November, 1837.]

To give even an epitome of the specification of this invention would be a work of considerable magnitude, and such as the importance of the invention does not seem to warrant. The specification extends over many skins of parchment, and is illustrated by between twenty and thirty sheets of drawings.

The principal feature of novelty claimed by the patentee seems to be cutting and shaping wood into various irregular figures, (gun stocks in particular,) by means of tools or cutters, resembling chisels, and of various shapes to suit the purpose.—These tools are moved along the piece of wood, and guided by guages, corresponding to the shape or configuration of the article intended to be made.

When these tools are once fixed in the machine, they are not to be removed until they are completely worn out, as they are sharpened and entirely worn out in the machine without their removal being necessary.

The under or lower part of the tools is sharpened, and as the tools wear away, by continual use, they are kept up to the work to the original distance at which they were placed by a compensating movement in the machine, not very explicitly described in the specification.—[*Inrolled in the Inrolment Office, May*, 1838.]

To William Brindley, *of Birmingham, in the county of Warwick, patent paper tray manufacturer, for his invention of improvements in the construction of presses.*—[Sealed 23rd December, 1837.]

Instead of using only one screw to raise or lower the follower of a press, the patentee proposes to employ four, which, being situated at different parts of the follower, distribute the pressure more equally throughout the same; a greater pressure may thereby be given to the goods, without the danger of injuring the press, and a press of considerably larger dimensions than those now in use, may be constructed upon this principle.

In the drawing accompanying the specification, four separate screws are adapted to the press; on the lower end of the shafts of the screws are mounted toothed wheels, which take into and are driven by a fifth wheel, mounted on a plain circular shaft, which is placed in the situation usually occupied by the screw shaft of the ordinary press. Immediately beneath the toothed wheel, and mounted on the same shaft with it, is a bevel wheel, which is driven by a bevel pinion, mounted on a horizontal shaft, and to which motion is given by a winch, or in any other convenient manner.

Upon motion being given to the bevel pinion, in the manner above alluded to, the said pinion will cause the bevel wheel and cog wheel, together with the upright shaft on which they are mounted, to revolve, and motion will be communicated, by the toothed wheel on the centre shaft, to the toothed wheels on the screw shafts: the screws will thereby gradually press or force down the follower on to the goods in the press.

The patentee does not mean to confine himself to the

use of four screws, as a larger or smaller number may be beneficially employed under certain circumstances;—he states that he sometimes uses only three, and sometimes, in presses of large construction, even as many as six, in order to distribute the pressure, and prevent any particular part from being overstrained.

The claim of invention is for constructing presses in the manner above described. — [*Inrolled in the Inrolment Office, June,* 1838.]

To JOHN CHRISTOPHERS, *of New Broad-street, in the city of London, merchant, for his invention of an improvement or improvements on anchors.*—[Sealed 26th April, 1834.]

THE specification of this invention is unaccompanied with any drawing to point out the particular features of invention, claimed by the patentee, and is altogether such a bungling affair, abounding in such gross mistakes, that we are surprised that any person should enrol such a document.

We say nothing about the utility or novelty of the invention; but its simplicity is such, that we should have thought it next to impossible to have made the gross blunders alluded to.

The patentee commences by saying that the present invention is an improvement upon a patent granted to him in the year 1838. This patent, he says, was for making the eye or opening of the shank *more than twice the length of the width.*

The present invention consists in making the eye or opening of the shank *one and a quarter times or twice the length of the width.*

The patentee in his specification goes on to say, that the eye or opening is to be made twice the *width* of the *length*, and that instead of making the said opening quadrangular, he makes it in form of an elipse, as in forging this particular form, the iron is gradually bent over into the required shape, instead of being turned up into sharp angles. The stock is rounded off at the edges, in order to be received into the eye or opening.

The claim affixed to the specification is in the following words:—" the invention is for forming shanks of anchors with eyes or openings, one and a quarter times the length of their width, as above described." The patentee thereby limits his invention to making the eyes of the shank of *one* particular size, although in the commencement of the specification, he very properly set forth that he makes the said eyes or opening of from one and a quarter to twice the size.—[*Inrolled in the Inrolment Office, October*, 1834.]

To Edward Cobbold, *of Long Melford, in the county of Somerset, Clerk, Master of Arts, for his invention of certain improvements in the manufacturing of gas, for affording light and heat, and in the application of certain products thereof to useful purposes.*—[Sealed 5th May, 1838.]

This invention consists in combining tar with peat, so as to form a compound substance, from which gas, for affording light and heat, may be produced; or it may be employed as fuel for the purpose of obtaining gas from coal.

The compound substance produced by the before-mentioned combination, will, of itself, yield considerable quantities of gas, if put into the retort, and coal used as the

fuel; or it may be used both as fuel and for the production of gas.

The invention also consists in applying, to useful purposes, certain products obtained during the manufacture of gas. The first product is coal tar, which may be used for making the compound substance before mentioned, and employed in the manufacture of gas, or used as fuel generally, when fuel of a bituminous nature is required. Another product may be used as a paint or pigment, or in making the same; and another may be employed in the manufacture and fusing of iron; and lastly, as manure.

The combination of peat, with coal tar, will vary according to the use to which the compound is intended to be applied, whether for obtaining gas therefrom, or to be employed as fuel for heating the retorts. In mixing peat with tar, to be used as fuel for the retorts, an earthy or alluvial soil should be employed; but for producing a substance to be distilled in retorts, the peat used should be as free as possible from earth. The materials are mixed in the following proportions:—two parts, by weight, of peat with one part of tar.—When these substances are intimately blended, they will form a compound, which may be used in the manufacture of gas, both as a means of assisting the ordinary fuel, and also as a substance, from which gas may be distilled; but when employed for the latter purpose, the peat should be in a very dry state.

When a compound of peat and tar, in a hard form, is required for burning, independent of any coke or other ignited fuel,—a quantity of charred matter, such as coke, or the ashes of peat fuel, reduced to powder, may be mixed with the peat and tar; and the compound produced may be formed into blocks, and, if necessary, pressed so as to form a close, heavy, and convenient fuel, which may be used for general purposes.

The patentee remarks, that although he has given par-

ticular quantities of peat and tar, to be mixed together to form the compound, yet it is evident that the proportions may be varied without departing from his invention. The particular quantities may, however, be ascertained by mixing the materials in small quantities, and observing the effect produced.

In respect to that part of the invention which relates to the application of certain products to useful purposes, the residuum from the peat is to be ground to an impalpable powder, or it may be mixed with water, and then dried and pulverised; after which it must be mixed with oil, turpentine, and other necessary materials, when it will be fit for use, as a dark or black paint.

In order to produce a brown paint, a quantity of peat, in its natural state, or ashes of peat, broken up into small particles, must be mixed with the pulverised residuum before mentioned, and ground up with oil and other necessary materials. The shade or colour of the paint is varied by introducing more or less of the peat or peat ashes.

The next beneficial use of the products obtained in the manufacture of gas, is combining the residuum from the distillation process, in the proportion of one to two, more or less, with small coal;—this compound, when moistened, may be advantageously employed by blacksmiths, in preparing iron, in their forges. The same residuum, when well saturated with water, and used in the proportion of one peck to one bushel of coke, may be beneficially employed in melting or fusing iron or other metals, as it considerably increases the heat.

The residuum, if not wanted for either of the above purposes, may be ground up, or reduced to a fine powder, and used as manure, as it possesses the nutritive properties of soot; and on some soils it will be found to be equal to, if not superior to bone-dust, for agricultural purposes.—[*Inrolled in the Inrolment Office, November*, 1838.]

To William Neale Clay, *of West Bromwich, in the county of Stafford, manufacturing chemist, for his invention of improvements in the manufacture of iron.* —[Sealed 19th December, 1837.]

There may be said to be three classes of iron ore:—First, the common argillaceous iron stone, generally used in the manufacture of iron in Great Britain; secondly, the rich carbonates of iron, containing little earthy matters, which, when roasted, part with their carbonic acid, and absorbing oxygen, become, (after roasting,) oxides of iron; thirdly, native oxides of iron, either pure or combined with silica, and in very small quantities, other earthy matters; and according to the ordinary means now pursued, from making iron from iron ores, it is well known that that description called argillaceous ores, are commonly employed; such for instance, as are found in the coal fields of Staffordshire, Wales, Scotland, and in other places; and in making iron from such ores, they are in the first instance submitted to the process of roasting, and the iron stone or ore thus treated, is called "burnt mine," "roasted mine," or "roasted ore;" such *burnt mine, roasted mine,* or *roasted ore,* with suitable fuel and fluxes, is then submitted to the process of smelting, in large blast furnaces, and run therefrom into what are called pigs, or in some cases directly used for iron casting. In case such pigs are to be converted into malleable iron, they are submitted to the processes of the refinery and puddling furnaces, all which is well known and in extensive practice in this country; and in some instances, iron masters have recourse to the mixture of certain portions of the red and other rich iron ores of Cumberland, Lancashire, North Staffordshire, and other places, with the roasted argillaceous iron ores above mentioned, in order to enrich those poorer ores. But such is the peculiar property

of the rich iron ores referred to, under the heads secondly and thirdly, that they are not capable of being manufactured into iron by the process above stated, when used alone, although I believe that some of the rich Lancashire ores are for particular purposes, and mixed with a small portion of poor ore, at considerable cost, reduced by means of charcoal in blast furnaces.

Now it is well known that the red and other rich ores, above mentioned, contain much more iron in a given quantity of ore, than the argillaceous ores, mainly employed; and the veins of such rich ore are in many places in great thickness; but up to this present time, the ores under the heads secondly and thirdly, have not by themselves been brought into practical working, but have only been partially used, combined with poorer ores, in the manufacture of iron.

Now the first object of my invention relates to a mode of working such rich ores, and producing malleable iron therefrom by a very simple process and at a very small cost compared with processes now employed for making iron from argillaceous iron stone or iron ore.

I will now proceed to describe the process I have pursued and found to answer, and which in combination with the converting of the richer ores, on a practical scale, constitute my invention.

I take any quantity of the red Lancashire or Cumberland ore, or other ores of a rich character, and break the larger lumps by means of a pair of rollers or otherwise, to about the size of walnuts, which I believe to be the best size for working;—with one hundred parts, by weight, of such broken ore, I mix twenty parts of clean dry coal ashes or cinders, or of coke, charcoal, charred peat, anthracite coal, or other suitable carbonaceous matter, broken so as to pass through a sieve of a half-inch mesh. This mixture is to

be put into retorts or vessels, which I prefer to be of a ∩ shape, about seven feet long and eighteen inches high, and two feet wide, made of clay, fire bricks, iron, or other suitable material, capable of sustaining bright red heat by daylight These retorts I prefer to be fixed horizontally in a chamber which may be constructed at the end of a puddling or other furnace, so that the otherwise waste heat of the furnace may be employed for heating such retorts and their contents, to a bright red heat, at which degree of heat the contents should be kept some time.

The chamber for the retorts is built suitable for containing several retorts (according as the puddling furnace is capable of supporting the requisite degree of heat,) between the end of the puddling furnace and the chimney, leaving a sufficient space, so as not to impair the draught of the puddling furnace; and I prefer that the ends of the retorts should be so much above the ground, that there may be an iron barrow run alongside, to receive the charges of the retorts as they are discharged.

By this arrangement the flames and heated vapours passing from the puddling furnace, heat the retorts or vessels on the exterior, without having access to the iron ore in the retorts. One end of each of the retorts is stopped with a door in a similar manner to that adopted in retorts for distilling coal for gas, so that they may be readily opened to discharge, and may be immediately charged and again closed, for it is desirable to be constantly working, so long as there is sufficient heat, and the retorts and furnace are in proper repair,—the capability for which constant succession of charging and discharging, is an important feature of utility in my process, for it does not require that the retorts should ever be cooled down, but, as above explained, so soon as one charge has undergone the process

and is discharged, a fresh charge is to be put into the retort, and there are to be pipes connected with the retorts, to carry off the vapours evolved in the process, similarly to gas retorts, in making coal gas, which may be conveyed to the chimney or elswhere.

In charging these retorts, I fill them with the mixture of iron ore, and cinder coke or coal, above described, until it reaches to the boundary line of the flues which heat the retorts; I then add two or three shovels full of cinder coke, &c., and close the door, so as to prevent the ingress of any atmospheric air. In this condition, the retorts are to remain for twelve hours or upwards, the duration depending on the degree of heat applied; but the completeness of the process may, at any time, be ascertained by taking out some of the pieces of ore from the retorts, by means of tongs, and with a file filing the surface of such ore to ascertain whether it has arrived at the metallic state; a very little practice will suffice to enable the workman to judge accurately of the process.

The charge on being drawn from the retorts may (when the product is to be made into malleable iron,) be immediately conveyed into a puddling or balling furnace, and if the product appears not to be generally in a metallic state, five per cent or more, of small anthracite coal or other carbon, is to be put into the puddling furnace with it. The prepared iron or product from the retorts is to be balled in a furnace of the customary description, as if treating "refined iron" of the ordinary process of manufacture, and it will "come to nature" very readily, and may be said to be a welding of the many parts into balls rather than puddling; and after the cinder is well worked out it may be balled or looped, (or by whatever other name the process is called,) and taken to the hammer, or rolled according to the will of the operator.

I have here described the retorts as being set in a chamber applied to a puddling furnace, in order to use the otherwise waste heat at the same time. I do not confine myself thereto, as a chamber with retorts may be heated by other furnaces, and although I have mentioned twenty parts of cinder coke, charcoal, anthracite coal, or other suitable carbonaceous matter to one hundred parts of ore, I do not confine myself thereto,—the object is to have sufficient. I have found, that a larger quantity than is really necessary for the process, at the degree of heat above mentioned, is not prejudicial, but it has fully effected the object of my invention.

And I would further remark, that although I have mentioned particular sized and shaped retorts, and their being set in a horizontal position, I do not confine myself thereto, as the same may be varied, provided the character of my invention, as above explained, is otherwise retained; and although I prefer the using of retorts, such as are herein described, having the requisite heat applied to the external surface thereof, I do not confine myself thereto, as large masses of iron ore may be heated, according to my invention, and a furnace similar to a conical lime kiln, may be employed, in pursuing this mode of carrying out my invention.

I place a mixture of one hundred parts of ore with sixty parts of coal, coke, or other suitable carbonaceous matters, or thereabouts, in the kiln, and having fired and raised the kiln to a very bright red heat, as equally as possible, I then prevent all further ingress of atmospheric air at the lower part of the kiln, by stopping up the apertures;—having thus stopped all admission of air from below, I put five or six inches of anthracite coal, coke, or other suitable carbonaceous matter, on the surface; by this mode of treatment, the fuel in the ignited kiln, being deprived of all further

supply of atmospheric air, will so act upon the iron ore as to reduce it into the metallic state,—and the progress of such working may be ascertained by taking out portions, from time to time, as explained, in respect to the retorts; and when it is judged that the iron ore has become deoxydized, the charge may be drawn, and a fresh one immediately supplied to the kiln or furnace.

I would, in conclusion, further state, that when it is desired to make cast iron, according to my invention, I charge the retorts with thirty parts, by weight, of the carbonaceous matter or matters, above named, to one hundred parts of the rich iron ore, and continue the application of heat for a longer time, say for half as long again, than for simply reducing the iron to a metallic state,—for in order to make cast iron, it is necessary to impregnate it with carbon to that extent, that it will readily melt when taken to the cupola furnace of an iron founder, who may then use it as he would the broken pig iron of the old process.

I would remark, that I am aware it was several years back proposed to melt such rich iron ores in pots or crucibles, with charcoal or other carbon, in order to produce steel by such process;—I do not therefore claim any process of retorts or vessels, or kilns, for treating such rich ores with carbon, where smelting is performed; and I am aware that as a chemical fact, it is known that iron may be obtained by cementation, from burnt argillaceous ores;—and further, it has been proposed to submit "burnt mine," roast mine," or "roast ore," in a practical form, according to a system of tests, to the well known process of cementation, like that pursued in converting iron into steel in closely cemented vessels, such process of tests requiring the heat to be gradually raised to the proper high degree of temperature, then retaining the same to that heat for many hours; and then gradually cooling down the same

before drawing the charge, by which it was proposed to produce steel and iron from roasted mine, such process being the subject of a patent, in the name of John Isaac Hawkins, dated the fourth day of July, one thousand eight hundred and thirty-six; but such process of test and cementation, would probably be at much greater cost than reducing the like roast or burnt mine, or ore, by the ordinary blast furnace, which, as is well known, is the usual mode of making iron from like materials; and I have mentioned the processes, to state, that I lay no claim thereto; for my invention relates only to the working of the richer ores, and such as are not reducible by the ordinary means of blast furnace; and does not relate to the roasted argillaceous ores, commonly employed in the manufacture of iron; and moreover, it is not necessary previously to roast such rich ores, as I have above mentioned; and it would be only an unnecessary expence so to treat such ores.—[*Inrolled in the Inrolment Office, June,* 1838.]

To CHARLES FRANÇOIS EDOUARD AULAS, *of* 38, *Grande Rue Verte, Paris, in the Kingdom of France, but now residing in Cockspur-street, in the county of Middlesex, gentleman, for an improvement or improvements in preparing writing paper, so as to prevent the discharge of the ink therefrom without detection, and to prevent the falsification of writing thereon,—being a communication from a foreigner, residing abroad.*—[Sealed 7th November, 1837.]

THE method proposed for preventing forgeries and alterations in writings without detection, consists in covering the paper with a design, composed of very minute figures,

which cannot be distinguished except by a close inspection. The sheet of paper, when covered with such a design, presents a regular and evenly tinted appearance: upon the same plate or engraved cylinder, which is furnished with the design above-mentioned, the patentee proposes to engrave a bolder and more distinguishable design, consisting of circles, straight lines, or a human or other figure, engraved in such a manner as to be quite evident at the first glance, without the necessity of a microscopic observation, as in the first instance.

The first described design, the patentee denominates the ground, and the latter the vignette, and it is the combination of these two designs, for the purpose of preventing the falsification of writing, that constitutes the invention claimed by the patentee.

The designs may either be engraved by hand or by machinery, and may consist of any figures, such as polygons, circles, &c. Bankers' cheques and bills of exchange have been covered with elaborate designs of the above description; but, although such designs may raise great obstacles to the falsification of writing, yet they do not render forgery impossible; as a clever engraver, with a knowledge of printing, might possibly restore any part of such design that may have been obliterated, and in such a manner as to give to the restored part the appearance of the original.

Now, the difficulty of counterfeiting the design on a sheet of paper, prepared according to this invention, consists in the impossibility of restoring the vignette part of the design to its original state, in which all the lines of the said vignette intersected certain known parts of the ground design. The designs may be printed with delible or indelible ink or colour, as may be desired, the preparation of which will be perfectly understood by printers.—[*Inrolled in the Inrolment Office, May,* 1838.]

To Pierre Armand le Comte de Fontainemoreau, *of Charles-street, City-road, in the county of Middlesex, for an improved method of preventing the oxidation of metals,—being a communication from a certain foreigner, residing abroad.*—[Sealed 5th May, 1838.]

The patentee, in the outset of his specification, states that this invention has for its object correcting and remedying certain errors and defects existing in an invention, for which a patent was granted to Henry William Craufurd, on the 29th April, 1837, the specification of which patent was published in Vol. 12, of our present series, see page 65.

The invention patented by Mr. Craufurd, consists, in covering or coating iron and copper with zinc, either in a state of fusion or in a solid state, reduced to powder and applied as a paint; which coating of zinc was, in some cases, covered with a second coating of tin.

The object of the present patent is as before mentioned, firstly, correcting certain errors in former invention, and also, by various new methods, to render zinc more universally applicable to the protection of metals for oxidation.

In preparing articles for receiving the zinc coating, the same process as that described by Mr. Craufurd is followed, namely, immersing them in an acidulated bath, and afterwards scouring them, in order to remove any oxide. If it is not convenient to apply the coating to the articles immediately upon their being removed from the acid bath, they should be placed in lime water, or other alkaline solution.

In melting the zinc, Mr. Craufurd's specification directs that it should be covered with sal-ammoniac, but resin and carbonate of soda have been successfully used instead thereof, or any black or white flux, which will preserve

the zinc from oxidation, may be used. Furthermore, in Craufurd's specification the zinc is applied in a state of fusion, or in a solid state, reduced to powder, and mixed up into a paint; but it is found preferable to use it in a dry pulverised state, and it is prepared in the following manner:—The zinc is placed in a reverberatory furnace, and atmospheric air being totally excluded, the temperature of the melted zinc is raised to a degree approaching red heat; the door of the furnace is then opened, and the zinc skimmed; then one-tenth of its weight of wrought-iron filings, moistened with muriatic acid and sal-ammoniac, is thrown into the fused metal, which should be stirred all the while. When this is done, the surface of the zinc must be covered with finely-pounded charcoal, and the temperature of the metal raised to cherry-red heat, at which temperature it must be maintained for about an hour, stirring occasionally with an iron rod or poker.

The melted metal, thus prepared, is allowed to run into a brick or cast-iron trough, where it is covered over with a cast-iron lid to exclude the air. The stirring operation is to be continued in this trough, by means of an iron rod passing through the lid, until the metal has acquired such a solidity from cooling, as to render it impossible to continue stirring. When the metal has become quite cold, it should be ground into powder, and if found to be pliable, the operation has entirely succeeded. The powder thus obtained will preserve any articles from oxidation, and will be found peculiarly applicable to polished iron and filed steel, such as clock-work, ironmongery, hardware, as such articles are effectually preserved by merely covering them with the powder, even though they should be exposed to wet and damp.

The zinc may also be applied in the shape of paint, the zinc powder being mixed with any of the unctuous sub-

stances usually employed in making paint. Those substances which are conductors of the galvanic fluid answer best, and a small quantity of white lead may be added to give it consistence.

A paste may be made with the same powder, by mixing it with melted wax and tallow, in the following proportions:—Ten parts of zinc powder, one part of melted wax, and about one-fiftieth the whole bulk of tallow or oil. When copper, steel, or polished iron articles, are rubbed with this paste, they will be effectually protected from oxidation.

A zinc paper or wrapper may be made for protecting small polished metal articles, by introducing very finely pounded zinc into the pulp of the paper during its manufacture; or if common paper is covered with an adhesive substance, such as gum or paste, and the fine powder sprinkled over it, the same effect will be produced. Animal glue must not be used for this purpose, as it has a tendency to make iron rust.

Articles that have been zinced by any of the methods above described, may be further protected by moistening them with a rag dipped in a solution of sal-ammoniac; by this means a muriate of zinc is produced. This operation will be found exceedingly useful for fire-arms and other filed and polished articles. When the articles are well covered with zinc, they are polished, the unevenness of the zinc being first removed by means of files or scrapers, and afterwards polished with pumice, sand stones, or emery-paper, and the operation is finished in the ordinary manner. Care must be taken that no hard bodies are employed in the polishing operation, otherwise parts of the zinc may be rubbed off;—cork, leather, rags, or similar materials, should be employed.

When cannon balls or other large articles are to be

zinced, they must be heated in a reverberatory furnace, and the screws or other parts which do not require to be protected are to be covered with a thin coating of clay, and the holes are to be stopped up with wood.

To protect nails and other small articles, they are placed in a wire basket, and plunged into melted zinc, covered with sal-ammoniac. When the basket is taken out of the metal, it is to be carefully shaken, so that no excess of zinc should adhere to the articles, which are then thrown into water, or some other fluid which has no affinity for sal-ammoniac.

The patentee next describes the method of combining solid plates of zinc with other metals, for their protection from oxidation, or in other words, how copper, iron, or other metals may be plated with zinc. The iron, copper, or other metal, is previously cleansed from oxidation, in the manner described in Mr. Craufurd's specification before alluded to. The sheet of metal, so prepared, is covered with a thin sheet of zinc, powdered with sal-ammoniac, and the two sheets are then passed through heated rollers, from which they are passed into water in a perfect state of combination.

Metals may also be preserved by alloys of zinc and tin, lead, bismuth, or quicksilver, by melting any of these metals in a crucible with zinc, and dipping the article to be preserved in such mixture. When fusion takes place, a small quantity of sal-ammoniac is thrown in, and the mixture is left to evaporate, and the article operated upon is, before cooling, thrown into cold water.

In conclusion, the patentee says, that he does not claim the powder made from zinc, nor the paint or paste made with it, as they are already claimed in Craufurd's specification; but he claims the improved processes, before described, for making powder of zinc, and of applying the

same in a dry state, as well as in the state of a paint or paste for preserving metals from oxydation; he also claims alloying or combining zinc with other metals and substances for the said purposes, and also covering plates of metal with zinc, by means of heated rollers, as above described.—[*Inrolled in the Inrolment Office, November,* 1838.]

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 248, Vol. XVI.)

The abstract of Mr. Parkes's communication having been read, Mr. Enys remarked, that Mr. Parkes had adopted a different unit of power to the one he was accustomed to employ: but that was a point on which he was not disposed to insist, and he was prepared rather to yield to Mr. Parkes's opinion where they differed. Agreement on terms was very important, and he wished to see more accuracy introduced in the use of certain terms relating to engines; he would confine the term 'duty' to the net work, and the gross work he would call 'effect.' In speaking of a locomotive engine, he conceived the goods carried to constitute the duty—the whole mass moved, the effect. The duty in Cornwall is a theoretical term, being the water which ought to be raised according to the column displaced, but the whole of which did not reach the surface; and the whole mass of pump work, water, &c., set in motion, is the effect. The duty is not commensurate with the effect, as it is independent of friction and other expenditure of power. The pitwork is is not always well executed, and is not under the care of the engineer. Duty in Cornwall is, in fact, entirely a commercial question, it having

been instituted as a check between the adventurers and the engineer who originally undertook to perform the work of pumping for a certain share of the saving of fuel to be made. There were three distinct causes of improvement in Cornwall, viz. in the boilers, in the application of highly expansive steam, and the pit work.

Mr. Wicksteed, in reply to a question as to the work now being performed by the engine at Old Ford, stated the general result to be, that with small Newcastle coals of inferior quality, and of such a size as to pass through a screen of three-quarter inch mesh, the duty amounted to 71 millions raised one foot high with 94 lbs. of coal. He had experienced great difficulty in procuring good Welsh coal, but with some Merthyr coal he had recently tried, the duty immediately increased to 91 millions.

In the Old Ford engine, the steam is cut off at one-third of the stroke, and the water is raised by the weight of a mass of iron acting on the water at the return stroke. With the ordinary valves there is a loss of about one-tenth, but with the valves invented by Messrs. Harvey and West, used in the Old Ford engine, there is no loss and no perceptible blow from the water on the valves closing, although no air is admitted beneath.

The speed of this engine varies from one stroke to ten per minute, according to the demand for water. In Cornwall, it is thought that at slow speed there is a considerable saving of fuel, but he is of opinion that there is no difference in duty at a fast or slow speed, provided there is sufficient time for opening and shutting the valves.

As to the term duty, although it is important to know what is the absolute quantity of water raised, yet that is not the whole effect. The engine raises a certain weight of rods, which is its load, and this weight should, in the return stroke, produce a certain given effect in water brought to the surface; but, owing to bad valves, leaks in the pumps, and other causes, the quantity of water raised is not equal to the calculated amount. We cannot say that an engine has not done its duty because a portion of the

water is lost. Two engines, equally good, and of identical power, may not produce equal results; because one may be raising water close beneath the beam; another, up a shaft at some considerable distance, by means of a series of long horizontal motioned pump rods; the latter, again, may be doing a duty of 20 millions in working the pump rods only.

It was his intention shortly to present to the Institution a complete report of the work done by his engine, with drawings of every part; but he was waiting to have the opportunity of ascertaining the evaporation from the Cornish boilers as well as from those of a pumping engine of Boulton and Watt's, also in use at Old Ford, so as to determine at the same time the respective duty and consumption of steam by the two engines.

Mr. Field insisted on the importance of distinguishing between the duty and effect, by using the former term for the water actually raised, and the latter for the real power expended. He understood these terms to be so applied to engines for water works in London, and that effect included the friction of the water in the pipes and all other causes of diminution of duty. The real effect should be ascertained from the pressure of the water at the pump, as determined by a mercurial guage. It is generally understood that, in speaking of the real comparative effects of the water works engines in London, it would be unfair to take the water raised, as the same power would in one case be expended in raising water 100 feet, as is expended in another case in raising water 200 feet. The pressure of the water at the pumps is the proper standard of comparison.

Mr. Parkes stated, that in his paper he had used the term duty as distinguished from the absolute power of the engine. The same Cornish pumping engine at different periods performs very different amounts of duty, although the absolute power exerted by the steam is the same. This arises from additions to the friction by new pump rods, and from other causes, The Cornish result is below the real duty done by the engine, taking the term in their acceptation of it, and using their mode of calculation for that which is by them considered a purely commercial

question. The only correct manner of ascertaining the absolute power exerted by pumping engines, so as to compare them with rotative engines, is to take the pressure on the piston and the value of the vacuum on the other side at the same time. The term duty expresses the true, useful, or commercial performance of the engine, but is no measure of the absolute power of the steam which has to overcome the friction of the engine, pumps, rods, &c., in addition.

Mr. Enys, in reply to a question from Mr. Gordon, as to the speed at which an engine is worked with the greatest economy, stated the general opinon in Cornwall to be in favour of about nine strokes per minute; if there was a pause of half a second between each stroke, the Cornish engineers were perfectly satisfied. The indoor stroke is usually at the rate of from 250 to 260 feet per minute, and the outdoor stroke about 140 feet. When the number of strokes exceeds nine, the balance requires to be altered; the engine then runs out quicker, but requires a greater expenditure of steam to bring it in again. In answer to a question relative to Woolfe's engines, he believed they had never had a fair trial, as all the boilers originally adapted to them were much too small, and the tubes soon got full of oxide and mud: if the present system of Cornish boilers had been in use at the time, he thought they would have acted much better. Some engineers are so much impressed in their favour, that they are desirous of giving them a trial again with all their recent improvements.

Mr. Cottam mentioned an engine on Woolfe's principle which had worked perfectly well for several years. It is now grinding a bushel of corn with a fraction less than 4 lbs. of coal. The pressure of the steam in the boiler is from 22 to 25 lbs.

List of Patents

Granted by the French Government from the 1st of April to the 30th of June, 1839.

PATENTS FOR FIFTEEN YEARS.

To Alexandre Chesneaux, of Paris, represented by M. Perpigna, advocate of the French and Foreign Office for Patents, No. 2. ter: Rue Choiseuil, for improvements in waggons, calculated to run on rail-roads.

Hall, Powell, and Scott, of Rouen, represented by M. Perpigna, advocate, for an improved fulling machine,

Joseph Haley, of Manchester, represented by M. Perpigna, advocate, for an improved machine for sizing warp threads.

William Kingdom, of London, represented by M. Perpigna, advocate, for a new escapement for watches and clocks.

Miles Berry, civil engineer, of London, represented by M. Perpigna, advocate, for an improved apparatus to be used in the manufacturing of soap.

François Gervais, of Caen, represented by M. Perpigna, advocate, for an improved machine for excavating earth.

Charles Sanderson, of Sheffield, represented by M. Perpigna, advocate, for an improved process for reducing iron ore.

James Buchanan, of Glasgow, represented by M. Perpigna, advocate, for improvements in the springs of carriages.

François Colin, of Paris, represented by M. Perpigna, advocate, for improvements in the moulds for sugar making.

Oberg, of Stockholm, represented by M. Perpigna, advocate, for improvements in the manufacturing of woollen cloths.

Virginaud, Robert, and Guinaud, of Lyons, represented by M. Perpigna, advocate, for improvements in the jacquard frame.

De Rathen, of Montmartre, near Paris, for an improved locomotive engine.

Delaunay, of Paris, for improvements in the construction of ovens and furnaces.

Robertson, of Paris, for an improved capstan for the navy.

Delaunay, of Paris, for improvements in the manufacturing of carbonate of soda.

Maublanc, of Paris, for motive power to be used instead of steam.

Trebert, of Paris, for plastic substance, applicable to anatomical reproductions.

Richaud, of Paris, for a new process of making bread.

Royer, Truchelet, and Valson, for a machine for cutting wood.

Dogliani, of Marseilles, for an improved method of placing moulds in the refining of sugar.

Carlier, of Paris, for improved machinery for making barrels.

Goldemberg & Co., of Zorndoff, for a new method of manufacturing joiners' tools.

Gaudin, of Paris, for an improved system of the lighting of streets.

Boquillon, of Paris, for an improved regulator for regulating the flow of gas under all pressures.

Guebhard and Son, of Paris, for extraction of oils and spirits from empty casks which had contained the same.

Lefranc, of Neuilly, for a new mode of making wells and walls by damming.

Laranza, of Paris, for an improved nail machine.

Demarert, of Belloy, for a new mode of extracting peat.

PATENTS FOR TEN YEARS.

To François Feuillet, of Mezières, represented by M. Perpigna, advocate of the French and Foreign Office for Patents, No. 2, ter: Rue Choiseuil, for improvements in nail machines.

Gabriel, of Lyons, represented by M. Perpigna, advocate, for an improved bobbinet frame.

Rosier, of Montauban, represented by M. Perpigna, advocate, for a mechanical lamp.

Barker, of Paris, represented by M. Perpigna, advocate, for improvements in church organs.

Besson, of Marseilles, represented by M. Perpigna, advocate, for an improved filter to be used in sugar refineries.

Barillot and Savet, of Lyons, represented by M. Perpigna, advocate, for improvements in the manufacturing of velvet.

Baillie, of London, represented by M. Perpigna, advocate, for an improved ventilator.

Hallette, of Arras, for an improved steam engine.

Eude, of Rouen, for improvements in weaving.

Deharbes, of Paris, for improvements in hats.

Corbin de Boissières, for improvements in the melting of tallow.

Chabert, of Rouen, for substance extracted from the stem of the *Crassica Arvensis*, and applicable to the making of paper.

Wickham, of Paris, for improved trusses.

Parvin de Courteville, for an engine for raising water.

Havard, of Paris, for an improved water closet.

Legouge, of Paris, for improved paving, by means of blocks of wood, placed vertically.

Lheunte, of Paris, for new kinds of springs for chairs and sofas.

Fabre d'Olivet, of Paris, for improved paving.

Etard, of Paris, for an improved travelling trunk.

Poole, of London, for astral lamps and improved shades.

Malka and Abib, of Marseilles, for imitation of amber and coral.

Gamelin Brothers, of Bolbec, for a machine for grinding dye woods.

Mongal, of Paris, for an improved lamp.

Alcan, of Elbeuf, and Peligot, of Paris, for an improved method of oiling and scouring wool.

Fayet, of Paris, for an hydrolocomotive engine.

Gemelle, of Bourges, for a lamp with constant pressure.

Blondin, of St. Quentin, for improved spring bolsters.

Casenove, of Epernay, for improvements in the making of copal varnish.

Mirial, of Andrure, for improvements in the combing of floss silk.

Faullain, of Paris, for an umbrella with an excentric stick.

Callon and Pawells, for a new mode of transporting night soil.

Feuillatre, of Paris, for an improved syringe.

Catez, of Arras, for a lamp on an improved system.

Fisher, of London, for improvements in bobbin net frames.

Truffaut, of Paris, for improvements in husbandry.

Haumont, of Paris, for improvements in flooring.

Bryan, Donkin, and Co., of London, for improvements in paper machines.

Goldemberg and Co., of Zorndorff, for improvements in the manufacturing of scythes.

Vanneau and Monroy, of Paris, for apparatus for the making and refining of sugar.

Levasseur, of Havre, for a new mode of fastening the shutters of shops.

PATENTS FOR FIVE YEARS.

To Dèlaforge, of Paris, represented by M. Perpigna, advocate, No. 2, ter : Rue Choiseuil, for improved forged bellows

Aubrun and Herr, of Paris, represented by M. Perpigna, advocate, for an improved mode of roofing houses.

Craven, of St. Quentin, represented by M. Perpigna, advocate, for an improved system of combustion.

Rolin and Pendecœur, of Paris, represented by M. Perpigna, advocate, for improved fastenings for windows.

Weber and Vervins, represented by M. Perpigna, advocate, for a mill for grinding colours.

Behrend, of Berlin, represented by M. Perpigna, advocate, for artificial stone to be used for lithographic purposes.

Eveard Laton, of Soissons, (aisne,) for an improved measure.

Edwards, of London, for improved brushes, brooms, and pencils.

Crispy, of Bordeaux, for an anti-opthalmic remedy.

Champavere, of Paris, for a rotary steam engine.

Cail, of Paris, for an improved mode of joining pipes of steam boilers.

Cambray, of Paris, for a chaff cutter or corn mill and vegetable chopper, in one apparatus, and moved by the same power.

Prevost, of Paris, for a knitting machine.

Dumonthier and Guille, of Houdan, (Seine and Oïse,) for improvements in scissars.

Dubosc Brothers, of Rouen, for a mechanical jacquard frame.

Benoist, of Newbury, for apparatus for preparing candle wicks.

Oberwarth, of Paris, for an application of a new substance to all the purposes of coffee.

Bellenger Picard, of Caudebec, near Elbeuf, (Seine Inférieur) for a new bolt.

Dailly, of Paris, for an improved safety lock.

Jacquot, of Paris, for a new game founded on geometrical combinations.

Leroy, of Paris, for a system of carriage and cart.

Muller, of Colmar, and Cock, of Nidaltroff, (Moselle,) for means of using wind power.

Tachousin, of Paris, for an apparatus for distilling resinous matters.

Thevault of Montpellier, for an improved method of treating special diseases.

Caron d'Huart de Northomb, of Longroy, (Moselle,) for an oven for earthenware.

Ferguson and Barnèque, of Bavillers, (Haut Rhin,) for improvements in weaving frames.

Tassin, Father, and Son, for a fire-guard in metallic cloth.

Vigoureux, of Paris, for an improved jack for raising weights.

Vigoureux, of Paris, for a new mode of propelling carriages.

Joumar, of Paris, for a boiler made to prevent the expansion of liquids whilst in a state of ebullition.

Espic, of Bordeaux, for a medicament caller, *Cigarille Pectorale*.

Bonnie, of Paris, for a sofa containing a bed.

Radat, of Ivry, near Paris, for extraction of pyroligneous acid.

Badin, for a new system of advertisement.

Roger & Co., for a mechanical lamp.

Roche, of Castres, (Carn,) for a process of economising half the oil employed in the fabrication of woollen stuffs.

Delaunay, for an economical system of firing.

Fischer, for a piano lyre.

Vivien Guérin, for impermeable stuffs.

Boche, of Paris, for a primer for a percussion gun.

Barbeau, of Châtillon, near Paris, for improvements in the manufacturing of plaster.

Fradel, of Caen, (Calvados,) for new cotton lace with open work.

Duval, of Paris, for improvements in buckles and straps for clogs.

Beners, of Paris, for impermeable pasteboard.

Adorni, of Paris, for a uranographic machine.

Molerat and Co., of Paris, for improved razor cases.

Richard, of Paris, for detersive water for cleaning wood, stone, and metals.

Roger and Co., of Paris, for a new alarum.

Bastiné, for improvements in locomotives.

Lebrun, of Paris, for a microscope, applicable to spy glasses.

Rinaldi, of Paris, for improvements in pianos.

Gateau and Deon, of Sens, for acoustic apparatus.

Godin, of Paris, for billiard bands.

Grimoux, of Paris, for a helical probe.

Guenon de la Chanterie, of Paris, for improvements in water closets.

Milleret, of Paris, for water for cleansing the teeth.

Boisselet and Sons, of Marseilles, for a piano, called cledhermonique.

Perinet, of Paris, for improvements in key bugles and brass instruments.

Alexandre, of Paris, for pianos, called concertine.

Barbeau, of Paris, for a new system of earthen sluice.

Cyboulle and Pladis, of Paris, for a machine for rounding, while in a cold state, the iron bars used by wheelwrights.

Doumergue and Velliet, of Amiens, for an improved apparatus for heating the combs in the combing of wool.

Irroy, of Paris, for two new kinds of nails.

Aubert, of Paris, for a liqueur for the table.

Peyrels, of Paris, for a side saddle, with a mechanical pommel.

Bordas, of Paris, for an improved mechanical hat.

Moreau, of St. Dizier, for improvements in book-binding.

Cabeu, of Paris, for a new lamp.

Count de Castelet, of Marseilles, for a refreshing beverage.

Galy Cazalat, of Paris, for an apparatus for disinfecting seaports and marshy lands.

Lenoir, of Beauvais, for a portable press for wine and cyder making.

Brioude and Messand, of Paris, for an anti-friction grease for carriages.

Clerx, of Paris, for shoes with elastic soles.

Coursier, of Paris, for a lithographic press.

Fan and Bernadac Delabre, of Paris, for impermeable tissues.

Mallet, of Vizilles, (Isère,) for improved scales.

Mesnard, of Paris, for a new system of advertising.

Miallet, of Lyons, for a regulating plane, to be used in the manufacturing of velvet.

Baron d'Ingrande, of Rouen, for an apparatus for lighting on horseback.

Painparé, of Paris, for manufacturing wine from sugar.

Clostre, of Paris, for a frame for making the brading to be used in making list slippers.

Boucher, of Ruelle, (Seine and Oïse,) for an apparatus for washing linen.

Letestu, of Paris, for improved swing beds.

List of Patents

Granted for Scotland between the 22d May, and 22d June, 1840.

To Thomas Walker, of Golashiels, mechanic, for improvements in apparatus applicable to feeding machinery employed in carding, scribbling, or teazing fibrous materials.—Sealed 26th May.

James Hadden Young, of Lille, France, at present at 32, Norfolk-street, London, merchant, and Adrian Dilcambre, of Lille, aforesaid, for an improved mode of setting up printing types.—Sealed 28th May.

John Hawley, of Frith-street, London, watch-maker, (communicated by a foreigner abroad,) for improvements in pianos and harps.—Sealed 29th May.

Thomas Edmondson, of Manchester, for certain improvements in printing presses.—Sealed 1st June.

William Potts, of Birmingham, brass-founder, for certain apparatus for suspending and hanging pictures and curtains.—Sealed 2nd June.

Elijah Galloway, of Water-lane, Tower-street, London, for improvements in steam engines.—Sealed 9th June.

François Vouillon, of Princes-street, Hanover-square, (being a communication from a foreigner,) for improvements in the manufacture of ornamental woven fabrics.—Sealed 9th June.

William Daubney Holmes, of Cannon-row, Westminster, engineer, for certain improvements in the construction of iron ships, boats, and other vessels, and also in means for preventing the same from foundering; also in the application of the same improvements or parts thereof to other vessels.—Sealed 18th June.

John Crighton, Jun., of Manchester, machine-maker, for certain improvements in machinery for weaving single, double, or treble cloths, by hand or power.—Sealed 18th June.

New Patents

SEALED IN ENGLAND.

1840.

To Henry Augustus Taylor, of New York, now of Milk-street, Cheapside, merchant, for improvements in the manufacture of braid and plats,—being a communication. —Sealed 28th May—6 months for inrolment.

Alexander Francis Campbell, of Great Plumstead, Norfolk, Esq., and Charles White, of the city of Norwich, mechanic, for improvements in ploughs, and certain other agricultural implements.—Sealed 28th May—6 months for inrolment.

Sir Josiah John Guest, of the Dowlais Iron Works, Glamorgan, Baronet, and Thomas Evans, of the same place, agent, for their invention of certain improvements in the manufacture of iron and other metals.—Sealed 28th May—4 months for inrolment.

Edmund Leach, of Rochdale, Lancaster, machine-maker, for certain improvements in machinery or apparatus for carding, doubling, and preparing wool, cotton, silk, flax, and other fibrous substances.—Sealed 28th May—6 months for inrolment.

Daniel Gooch, of Paddington Green, engineer, for certain improvements in wheels and locomotive engines, to be used on railways.—Sealed 28th May—6 months for inrolment.

William Henry Smith, of York-road, Lambeth, civil engineer, for an improvement or improvements in the mode of resisting shocks to railway carriages and trains; and also in the mode of connecting and disconnecting railway car-

riages; also in the application of springs to carriages.—Sealed 28th May—6 months for inrolment.

George Henry Bursill, of River-lane, Islington, gentleman, for an improved method or methods of weighing, and certain improvements in weighing machines.—Sealed 28th May—6 months for inrolment.

James Allison, of Monkwearmouth, Durham, ironmaster, and Roger Lumsden, of the same place, chain and anchor manufacturer, for improvements in the manufacture of iron knees for ships and vessels.—Sealed 30th May—6 months for inrolment.

John Baptist Wickes, of Leicester, frame-work knitter, for improvements in machinery employed in frame-work knitting or stocking fabrics.—Sealed 30th May—6 months for inrolment.

William Pettitt, of Bradwell, Bucks, gentleman, for a communicating apparatus, to be applied to railroad carriages.—Sealed 30th May—2 months for inrolment.

John Hawley, of Frith-street, Soho, watch-maker, for improvements in pianos and harps,—being a communication.—Sealed 1st June—6 months for inrolment.

Pierre Desaure De Montmirail, of London-wall, gentleman, for certain improvements in the manufacture of bread,—being a communication.—Sealed 2nd June—6 months for inrolment.

Richard Freen Martin, of Derby, gentleman, for certain improvements in the manufacture of certain descriptions of cement.—Sealed 2nd June—6 months for inrolment.

Samuel Salisbury Eagles, of Liverpool, engineer, for certain improvements in obtaining motive power.—Sealed 2nd June—6 months for inrolment.

James Harvey, of Basing-place, Waterloo-road, timber-merchant, for certain improvements in paving streets, roads, and ways, with blocks of wood, and in the machinery or

apparatus for cutting or forming such blocks.—Sealed 2nd June—6 months for inrolment.

William Southwood Stocker, of Birmingham, for certain improvements in machinery, applicable to making nails, pins, and rivets.—Sealed 2nd June—6 months for inrolment.

Christopher Dain, of Edgbaston, Warwick, gentleman, for certain improvements in the construction of vessels for containing and supplying ink and other fluids.—Sealed 2nd June—6 months for inrolment.

James Roberts, of Sheffield, merchant, for an improved mode of fastening certain kinds of horn and hoof handles to the instruments requiring the same.—Sealed 3rd June—6 months for inrolment.

Samuel Wagstaff Smith, of Leamington, iron-founder, for improvements in apparatus for supplying and consuming gas.—Sealed 9th June—6 months for inrolment.

Robert Hampson, of Mayfield Print Works, Manchester, calico printer, for an improved method of block printing on woven fabrics of cotton, linen, silk, or woollen, or of any two or more of them, intermixed; with improved machinery, apparatus, and implements, for that purpose.—Sealed 9th June—6 months for inrolment.

Alexander Southwood Stocker, of Birmingham, for improvements in the manufacture of tubes for gas, and other purposes.—Sealed 9th June—6 months for inrolment.

Christopher Nickels, of York-road, Lambeth, gentleman, for improvements in the manufacture of braids and plats, being a communication.—Sealed June 9th—6 months for inrolment.

Thomas Edmondson, of Manchester, clerk, for certain improvements in printing presses.—Sealed June 9th—6 months for inrolment.

John George Shuttleworth, of Fearnley-place, Glossop-

road, Sheffield, gentleman, for certain improvements in railway and other propulsion.—Sealed June 9th—6 months for inrolment.

Francis Greaves, of Radford-street, Sheffield, manufacturer of knives and forks, for improvements in the manufacture of knives and forks.—Sealed June 11th—6 months for inrolment.

William Lance, of George-yard, Lombard-street, insurance broker, for a new and improved instrument or apparatus to be used in whale fishery, part or parts of which, upon an increased scale, are also applicable as a motive power for driving machinery.—Sealed June 11th—6 months for inrolment.

Benjamin Winkles, of Northampton-street, Islington, copper plate manufacturer, for certain improvements in the arrangement and construction of paddle wheels and water wheels.—Sealed June 11th—6 months for inrolment.

Joseph Wolverson, of Willenhall, Stafford, locksmith, and William Rawlett, of the same place, latch maker, for certain improvements in locks, latches, and other fastenings for doors.—Sealed June 13th—6 months for inrolment.

Ezra Jenks Coates, of Bread-street, Cheapside, merchant, for certain improvements in propelling canal and other boats, being a communication.—Sealed June 13th—6 months for inrolment.

Edward John Carpenter, of Toft Monks, Norfolk, a commander in the royal navy, for improvements in the application of machinery for assisting vessels in performing certain evolutions upon the water, especially tacking, veering, propelling, steering, casting, or winding, and backing astern.—Sealed June 13th—6 months for inrolment.

Richard Beard, of Egremont-place, New-road, gentleman, for improvements in apparatus for taking or obtaining likenesses and representations of nature, and of drawings and

other objects, being a communication.—Sealed June 13th —6 months for inrolment.

Richard Prosser, of Birmingham, civil engineer, and John James Rippon, of Wells-street, Middlesex, ironmonger, for certain improvements in apparatus for heating apartments, and in apparatus for cooking.—Sealed June 17th—6 months for inrolment.

Richard Prosser, of Birmingham, civil engineer, for certain improvements in manufacturing buttons from certain materials, which improvements in manufacturing are applicable, in whole or in part, to the production of knobs, rings, and other articles, from the same materials.—Sealed 17th June—6 months for inrolment.

Thomas De la Rue, of Bunhill-row, manufacturer, for improvements in printing calicoes and other surfaces.—Sealed June 20th—6 months for inrolment.

John Aitchison, of Glasgow, merchant, and Archibald Hastie, of West-street, Finsbury-square, merchant, for certain improvements in generating and condensing steam, heating, cooling, and evaporating fluids.—Sealed June 24th —6 months for inrolment.

William Hickling Burnett, of Wharton-street, Bagnigge Wells-road, gentleman, for improved machinery for cutting or working wood.—Sealed June 24th—6 months for inrolment.

William Ash, of Sheffield, manufacturer, for certain improvements in augers or tools for boring, being a communication.—Sealed June 24th—6 months for inrolment.

William Wood, of Wilton, carpet manufacturer, for certain improvements in looms for weaving carpets and other fabrics.—Sealed June 24th—6 months for inrolment.

Joseph Leese, junior, of Manchester, calico printer, for certain improvements in the art of printing calicos, and other surfaces.—Sealed June 24th—6 months for inrolment.

CELESTIAL PHENOMENA, FOR JULY, 1840.

D.	H.	M.	
1			Clock before the sun, 3m. 29s.
—			☽ rises 5h. 47m. M.
—			☽ passes mer. 2h. 3m. A.
—			☽ sets 9h. 57m. M.
	1	20	☉ in Apogee.
3	9	36	Vesta stationary.
4			Occul υ Leonis im. 9h. 3m. em. 10h. 4m.
5			Clock before the sun, 4m. 13s.
—			☽ rises 11h. 20m. M.
—			☽ passes mer. 5h. 13m. A.
—			☽ sets 10h. 52m. A.
	9	30	Pallas in oppo. ☉ intens. of light 0·323
6	0	10	♃ stationary.
	2	4	☽ in □ or first quarter.
8	6	14	♃ in conj. with the ☽ diff. of dec. 6. 21. N.
10			Clock before the sun, 5m. 0s.
—			☽ rises 5h. 26m. A.
—			☽ passes mer. 8h. 58m. A.
—			☽ sets Morn.
	17		☽ in Appogee
11	6	48	♄ in conj. with the ☽ diff. of dec. 6. 23. N.
12			Sagitarii im. 7h. 5m. em. 7h. 46m.
13	10		☿ in the descending node.
14	5	31	Ecliptic oppo. or ○ full moon
15			Mercury R. A. 9h. 27m. dec. 14. 39. N.
—			Venus R.A. 7h. 28m. dec. 22. 39. N.
—			Mars R.A. 6h. 18m. dec. 24. 2. N
—			Vesta R. A. 15h. 25m. dec. 13. 49. S.
—			Juno R. A. 7h. 57m. dec. 13. 38. N.
—			Pallas R. A. 18h. 34m. dec. 21. 24. N.
—			Ceres R. A. 19h. 55m. dec. 30. 0. S.
—			Jupiter R. A. 14h. 27m. dec. 13. 30. S.

D.	H.	M.	
—			Saturn R. A. 17h. 0m. dec. 21. 16. S.
—			Georg. R. A. 23h. 25m. dec. 4. 36. S.
—			Mercury passes mer. 1h. 54m.
—			Venus passes mer. 23h. 56m.
—			Mars passes mer. 22h. 44m.
—			Jupiter passes mer. 6h. 53m.
—			Saturn passes mer. 9h. 24m.
—			Clock before the sun, 5m. 36s.
—			☽ rises 8h. 57m. A.
—			☽ passes mer. 0h. 21m. M.
—			☽ sets 4h. 16m. M.
16			Ceres in oppo. to the ☉ intens. of light 0·735
17	16	14	☿ greatest elong. 26. 52. E.
18	22	49	Her: in conj. with the ☽ diff. of dec. 3. 10. S.
20			Clock before the sun, 5m. 59s.
—			☽ rises, 10h. 3m. A.
—			☽ passes mer. 4h. 7m. M.
—			☽ sets 10h. 39m. M.
22	6	46	☽ in □ or last quarter
23	13	25	☿ in Aphelion.
24	10	4	♃'s first satt. will em.
	15	16	♀ in sup. conj. with the ☉
	18		♀ in conj. with Juno.
25			Clock before the sun, 6m. 9s.
—			☽ rises Morn.
—			☽ passes mer. 8h. 33m. M.
—			☽ sets 5h. 39m. A.
—			Occul C. Tauri im. 16h. 4m. em. 16h. 43m.
26	10		☽ in Perigee.
	18	30	♂ in conj. with the ☽ diff. of dec. 3. 0. S.
27	9	57	♃'s third satt. will em.
28	9	28	Ecliptic conj. or ● new moon
	10	58	♀ in conj. with the ☽ diff. of dec. 0. 46. S.
	17	9	Juno in conj. with the ☉
	22		♀ in Perihelion
29	23	21	☿ in conj. with the ☽ diff of dec. 3. 30. S.
30	21	1	☿ stationary

J. LEWTHWAITE, Rotherhithe.

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Recent Patents.

To James Drew, *of Manchester, in the county of Lancaster, civil engineer, for improvements in the means of consuming smoke and economising fuel in steam-engine or other furnaces, or fire-places.*—[Sealed 8th November, 1838.]

These improvements in the means of consuming smoke and economising fuel in steam-engine or other furnaces, or fire-places, consists in providing the furnace or fire-place with a second or double set of fire bars, the one set or outermost of which are to be fixed to the boiler seating, as in ordinary furnaces, and the second or innermost set are to be fixed upon a carriage which shall be moveable in a vertical direction, immediately behind the outer set of bars; and thus the improved furnace will be divided into two distinct parts or portions; the first or ordinary half or

any convenient part thereof will support the fuel in the furnace, and the second or moveable set be capable of being raised nearer to or further from the bottom of the boiler, as occasion may require.

The object of my invention being the more perfect consumption of smoke, and consequent economy in fuel, is effected by such novel arrangement and construction of the furnace or fire-place, as the first or outermost set of fire-bars is intended to receive the fuel when it is firstly introduced into the furnace, and the charred or red hot coal is to be passed backwards, and thus placed upon the second or moveable set of fire-bars, and immediately raised by the sliding carriage close under the bottom of the boiler, and placed nearer to or farther from the boiler, as the case may require, thus forming a narrow heated passage, causing the smoke to come in contact with the charred or red hot coal, the heat from which passes under the bottom of the boiler on its way to the flues, and as it rises from the green or fresh coal in the front part of the furnace, it will be perfectly consumed in passing over the second or red hot fire instead of being allowed to escape along with other gaseous products to the chimney, and thereby cause a considerable saving of fuel and heat, which is commonly lost. As the principal feature of novelty is so perfectly simple that it may be readily applied to any description of furnace or fire-place, I had scarcely deemed it necessary to represent its application to any one in particular, as it is evident that its adaptation to the various descriptions of furnaces must greatly depend upon the circumstances of the case; and also the mechanical arrangements, and other details, for raising or lowering the second or inner set of fire bars, must entirely be at the option of the engineer.

It will readily be perceived that the mechanical agents or apparatus to be employed to carry my invention

into practical effect, are capable of a variety of modifications, and however applied, will not in the least affect the result of the operation; therefore, I have represented in the drawing, attached to these presents, a simple mode of working my invention in connection with an ordinary steam-engine boiler, merely for the sake of illustration.

Plate XV., fig. 1, is a longitudinal section of an ordinary steam-engine boiler and furnace; fig. 2, a plan or horizontal view; and fig. 3, is an end view of the same, in which the boiler seating, flues, furnace, doors, dead plate, and bars nearest the doors, are to be fixed, in the usual manner, or the bars may incline a little downwards at the furthest end from the dead plate. A second set of furnace or fire bars *a*, (which may be placed level or a little inclined towards the fixed bars,) are fixed upon a moveable carriage *b*; this carriage with its set of fire bars is capable of being elevated and lowered in a vertical direction, by running on parallel rods or slides, being fixed upon each side of the ash pit, or by any other suitable contrivance. In these figures the apparatus to be employed for working the carriage *b*, consists of two beams *c, c*, working upon their fulcra at *d, d*, and being elevated or depressed by means of the connecting rods *e, e*, and the cross bar *f, f*; the centre of this bar *f*, carries a nut *g*, working up and down the screw *h*, which is caused to revolve in its bearings *i, i*, by means of the bevil wheel *k*, and pinions *l, l*; one of these pinions causing the screw to be driven in one direction, and the other pinion driving it in the reverse, as the case may be. These pinions slide upon a key or feather upon the driving shaft *m*, and are thrown in and out of gear with the wheel *k*, by any ordinary catch or clutch box.

Now, supposing the engineer to be about to throw a supply of fresh coals upon the fire, he has merely to throw

that pinion into gear, which will cause the nut to ascend upon the screw, and consequently to lower the carriage *b*, with its grate, just a sufficient space *below* the front or ordinary grate to admit of the red hot cinders and clinkers to be raked out into the ash pit,—he then elevates the back grate *a*, a little until it is flush or on a level with the surface of the ordinary or front grate, when he passes a sufficient quantity of the red hot cinders from the furnace upon the back grate *a*. The other pinion is then to be put in gear, and the carriage with its grate to be raised up within a little space of the bottom of the boiler, (as seen in fig. 1,) and when the fresh coal is thrown upon the fire in the front or common grate, the smoke as it rises over the grate *a*, *a*, will be effectually consumed by the red fire or charred coal thereon; and the fuel and heat thus greatly economised, the process being repeated as often as found necessary.

Having thus described the object of my improvements, and the manner in which the same may be carried into practical effect, I desire it to be understood, in conclusion, that I claim as my invention the elevation of the second set of fire bars or back part of the furnace, either in a level or inclined position, and the lowering of the same in the manner and for the purposes above described, in whatever situation it may be used in connection with ordinary furnaces or fire-places; and also by whatever ordinary mechanism or apparatus the same may be worked, as the lever, screw, rack, or any other well known agent may be effectively employed, that shewn in the drawing being merely for the sake of illustration.—[*Inrolled in the Rolls Chapel Office, May*, 1839.]

Specification drawn by Messrs. Newton and Berry.

To George Philcox, *of Southwark-square, watch maker, for certain improvements in chronometers, watches, and other time-keepers.*—[Sealed 6th July, 1839.]

My invention of certain improvements in chronometers, watches, and other time-keepers, relates to the method of constructing the escapements of chronometers, watches, and other time-keepers, and consists in the novel arrangement, construction, and adaptation of peculiarly formed levers or impelling and detant pieces, by means of which I construct a more simple and less expensive escapement than those in present use.

My improved escapement is composed of two parts or levers, viz.—the propelling lever, which receives its power of action from the main spring of the time-keeper, and the detant or balance lever, which receives its impulse from the impelling lever. The latter lever, from its peculiar form, I call the "diamond lever," and to distinguish my patent escapement from others, I intend to denominate it "*the patent diamond lever escapement;*" and I will now refer to the drawings hereunto annexed, the better to illustrate my invention. (See Plate XVII.)

Fig. 1, represents an elevation or diagram of my improved escapement, upon an enlarged scale, as detached from the other parts of the mechanism of the time-keeper, the balance and propelling levers being shewn in the drawings, as separated or away from each other, in order better to exhibit the same, it being understood that when in action they are in contact with each other.

Fig. 2, is a plan or horizontal view of fig. 1. The same letters of reference are used to denote correspondent parts in all the figures. *a*, is the balance wheel, mounted on

the axle *b*; below this wheel is mounted the balance or receiving impulse lever *c*. The propelling lever receiving its power of action from the main spring in the ordinary manner, is shewn at *d*, mounted on its axle or shaft *e*, and on the lower part of this axle is placed the locking or detant lever *f*, seen best in fig. 2.

As the axle *e*, turns on its centre, one of the ends of the locking lever *f*, is brought by the force of the main spring against or into coincidence with a ruby pallat or stop-piece *g*, on the axle *b*, of the balance, (see fig. 1,) whereby the locking of the escapement is effected; but instead of the ruby pallat, a notch or groove may be formed on the axle *b*, itself. I do not however claim any part of the locking or its mechanism as my invention, for any other suitable arrangement of locking may be used or applied with my improved escapement levers, therefore it is not necessary for me to describe it more particularly.

Below the locking lever *f*, is mounted a small pinion *h*, (see fig. 1,) which is in communication with the ordinary train of wheels leading from the first mover, as will be readily understood by watch makers.

The dotted lines *i*, *j*, *k*, in fig. 2, are intended to shew the points of contact between the two levers *c*, and *d*, when in action in their motion through an escapement.

The first point of action is at *i*, where the balance lever first receives the impulse of the impelling lever; the second point of action or impulse is at *j*; and the third part at *k*.

The escapement above described is intended for chronometers and watches, it may, however, be adapted to clocks and other time-keepers; but, for these, I prefer the arrangement shewn at fig. 3.

It will be seen in this modification of my improved

escapement, that there are two propelling levers and two locking levers. This arrangement of double impelling levers is for the purpose of obtaining a sufficient number of beats within an hour, with the ordinary train of three wheels of a clock movement.

The arrangement shewn in figs. 1, and 2, may be employed for clocks; but, in order to gain the necessary number of beats, an additional wheel and pinion must be used; I therefore prefer the arrangement shewn in fig. 3, as it is simple in its construction, and because it may be adapted to the ordinary train of three wheels, as will be well understood by all clock makers.

Figs. 4, 5, and 6, represent, on an enlarged scale, the balance and propelling levers in the three different positions of motion or action, (that is to say,) at the three points of contact, or striking in the course of escapement; fig. 4, shews the first point of action; fig. 5, the second; and fig. 6, the third or last point, when the impelling or impulse lever leaves the balance lever.

Having thus described my improvements, and the manner of carrying the same into effect, I wish it to be understood, that I claim, as the invention secured to me by the hereinbefore in part recited letters patent, the adaptation and application to the escapements of time-keepers, of the impulse or propelling and balance or receiving levers, constructed and arranged as herein above shewn and described.—[*Inrolled in the Rolls Chapel Office, January*, 1840.]

Specification drawn by Messrs. Newton and Berry.

To Joseph Gibbs, *of Kennington, engineer, for an improvement or improvements in the machinery for preparing fibrous substances for spinning, and in the mode of spinning certain fibrous substances.*—[Sealed 21st December, 1839.]

This invention is described under three distinct heads; first, an arrangement of machinery for breaking the woody parts or boom from raw flax, New Zealand flax, and hemp, and partially separating the fibres. The material is fed into the machine through horizontal spouts or troughs, whence it passes between rollers, weighted, to produce pressure. These rollers have teeth or angular indentations all over their peripheries, in order that, as they revolve, they may pinch the material and crack the boom; and besides their rotary motions, the rollers have also lateral movements upon each other, which assist in breaking the boom, and thereby preparing the material for the subsequent operations of heckling and spinning.

The construction of the machine may be easily conceived. The rollers are all made to revolve by toothed gear upon their axles, driven by one actuating wheel and pinion, and the lateral movements are produced by excentrics upon the axle of the driving wheel, which cause the rollers severally to slide endways.

The feature of novelty claimed, is merely the particular arrangement of the parts shewn in the several figures of the drawing appended to the specification, constituting, as a whole, a machine for breaking and preparing flax, &c.

The second head of the invention, is the employment of a sort of scribbling engine for preparing floss silk. The silk is conducted, in a uniform thickness, from a feeding table, between rollers, to the cylinder or barrel, covered

with fine pins, which, as it revolves, takes up the fine filaments of silk, and they are pressed in between the pins on to the surface of the barrel, as it goes round, by a cylindrical brush, which lies in contact with the barrel. When a sufficient quantity of the silk has been thus lapped on to the surface of the barrel, the operation is suspended, and the lap of silk so formed is then taken off in a sheet and placed in another machine, to be drawn and spun into threads or yarns; or the lap of silk may be separated in its width into several sliders, and passed immediately between drawing rollers to the spinning machine. In this part of the invention, the arrangement only of the whole machine is claimed as new, not the parts separately considered.

The third head of the invention, is the production of a peculiar sort of yarn, which is made by spinning or winding very fine fibres of cotton or other material, round a previously spun yarn of flax, or other fibrous thread. To effect this, any convenient construction of spinning or winding machinery may be employed, in which the previously spun yarn may be conducted from a bobbin, and brought under the operation of a winding flyer. The object of this winding is to give tenacity and strength to fibres of extremely delicate and fine materials.—[*Inrolled in the Inrolment Office, June,* 1840.]

To John Leslie, *of Conduit-street, Hanover-square, in the county of Middlesex, tailor, for improvements in measuring the human figure,—being a communication from a foreigner, residing abroad.*—[Sealed 9th December, 1830.]

This is an apparatus consisting of a combination of elastic metallic straps or bands, which are all connected together

by joints, forming branches from the main stem, and producing a figure somewhat resembling the human skeleton.

The apparatus is to be attached to the person whose form is desired to be obtained, and made fast round every part of the body. The straps or bands are all of them double, sliding in sockets, and are thereby capable of extension and contraction in order to suit the sizes of different persons. When put on, the straps must be all adjusted to fit exactly the parts of the body round which they are passed; and when so adjusted to their proper lengths, each strap is made fast by a stud, which drops into a hole in the fellow strap.

If we understand right, the whole skeleton or frame of straps may, when so adjusted to the form, be taken off the person by detaching some part behind without deranging the joints or adjustments of the respective straps, and from this skeleton the garment is to be made; but by what means the forms and dimensions of the parts are to be transferred from this apparatus to the cloth, in order to produce the required garment, we have no instructions, and therefore can say nothing of its adaptation to the service of tailors and dress-makers, for which the specification states it is designed,—[*Inrolled in the Inrolment Office, June,* 1840.]

To Joseph Webb, *of Huddersfield, in the county of York, manufacturer, for his invention of improvements in machinery, for raising the pile of woollen and other cloths.*—[Sealed 1st August, 1839.]

This invention relates, first, to that part of the process of raising the pile on woollen cloths, which consists in producing an equal damping of the cloths, in order to their

being evenly and equally raised; and secondly, to improvements in gig mills or machinery, for raising the pile on woollen and other cloths.

In raising the pile on woollen cloth, it is of the greatest importance that the cloths should be evenly and equally damped, otherwise the act of raising, whether by teasles or wire cards, will cause the surfaces most damped to raise more readily than those parts of the surfaces less damped, and thus produce an inequality in raising to the general surfaces of cloths which are operated upon.

Plate XVI., fig. 1, represents a side elevation of a machine for damping woollen cloths, about to be operated on by the raising process; fig. 2, is an end view of the machine; A, A, is the framing of the machine, the nature of which is clearly shewn in the drawing; B, is a bed or platform on which the cloth is spread, and by which it is supported in its progress through the machine; C, C, are three pipes, each perforated with a series of small holes, so as to produce a series of small jets of water, and one or more of these pipes may be used according to the degree of damping it is desired to give to any particular cloths passing through the machine; D, is a roller over which the cloth first passes; E, is a roller by which the cloth is drawn through the machine; this roller is covered with felt or woollen cloth, and the axis of the roller E, receives motion by a strap or band or other convenient means from a steam-engine or other power; and on the axis of the roller E, is affixed the cog wheel F, taking into and driving the cog wheel G; on the axis of this wheel are affixed two cranks H, that are attached to the connecting rods I, the other ends of the connecting rods being connected to the sliding bars J, one on each side of the machine; hence, when the machine is in motion, the bars J, which are guided in staples, will move to and fro, and by such means

fold the cloth as it comes through the machine, the throw of the cranks being regulated according to the size of the fold which it is wished to obtain. The two bars J, carry two rollers K, K, which turn easily in their bearings, and the cloth passing between the rollers K, will be moved to and fro, and thereby folded as it descends from the roller E, as will be readily understood on examining the drawing; L, is a roller resting on the cloth that is passing over the roller *e*, and distributes and regulates the moisture; this roller L, is hollow, and has a jet of water thrown into it at one end; it is pierced with a number of holes, and is covered with felt or woollen cloth that is kept moist by the means aforesaid, and the axis of this roller moves freely in the slots for that purpose.

The patentee then proceeds to describe the second part of the invention:—Fig. 3, represents a right hand end view of a gig mill or machine for raising the pile on woollen and other cloths, constructed according to my invention; fig. 4, is a left hand end view thereof; fig. 5, is a front view; and fig. 6, is a plan of some of the parts that relate to the cross dressing or raising.

In each of these figures the same letters indicate similar parts; *a, a*, is the framing of the machine, the nature of which is clearly shewn in the drawings; *b*, is the front raising cylinder; and *c*, is the back raising cylinder, the axis of which respectively turn in suitable bearings, carried by the side framings of the machine. These cylinders *b*, and *c*, are arranged for raising by teasles, as is well understood; but it is evident, that wire card cylinders may be used if required, as is also well understood, and forms no part of my invention, nor does the placing of two gig cylinders one behind the other, form any part of my invention, unless combined with suitable gearing or apparatus to cause such cylinders, when placed one behind

the other, to revolve in such manner as both to raise the cloth, (passing through the machine,) in the same direction at the same time, and also, being capable of raising the cloth, (passing through the machine,) in opposite directions at the same time; and I would remark, that I am aware that double machines or gig mills, for raising the pile on woollen cloths, have before been used with the cylinders working both at the same time, but one above the other, by which much inconvenience is experienced, owing to the great height of the machine; and I would also remark, that I am aware that a machine, and perhaps machines, have been made having two cylinders, one behind the other, but so arranged that only one cylinder acted at one time; thus only performing the work of a single gig mill, though taking the room of a double machine. *d*, is the main or driving shaft mounted in suitable bearings at the right hand end of the machine at *e, e*; this shaft receives motion by a strap or band or other means, from a steam-engine or other power, as is well understood by machine makers; *f, f*, are two bevelled toothed wheels, one affixed on each of the axes of the gig cylinders; *g*, is a bevel toothed wheel, affixed on the driving shaft *d*, the wheel *g*, taking into and driving the wheel *f*, affixed on the axis of the front gig cylinder, and by this means rotary motion is communicated to the front gig cylinder; *h*, and *i*, are two bevelled toothed wheels on the driving shaft *d*, and are turned thereby, but are capable of sliding along that axis, in order that either the wheel *h*, or *i*, may take into and drive the wheel *f*, affixed on the axis of the back gig cylinder; by this means the back gig cylinder may be caused to turn in such manner as to raise the cloths passing through the machines, in the same direction as they have been raised by the front gig cylinder, or reverse the direction of the raising, as will readily be

understood on examining the drawing, aided by the description hereby given. The wheels *h*, and *i*, are connected together, either by bolts or by a tube, embracing the main or driving shaft, and there is a feather or projection on the main or driving shaft, as is well understood by machinists, in order to cause the wheels *h*, and *i*, to move round with the driving shaft, yet allowing of the wheels to slide along that shaft; *j*, is a forked lever, moving on a fulcrum at j^1; this forked lever embraces the grooved nave or boss of the wheel *i*; and *k*, is a screw by which the lever *j*, can be moved towards the back or front part of the machine, and thus put the wheels *h*, and *i*, into and out of gear with the wheel *f*, of the back gig cylinder; *l*, *l*, are two sloping boards, with a gutter at their lower ends; by this means any water falling on the boards, will be carried clear of the machine. A, A, is the line of the floor on which the machine stands, and it is important that the machine should be only a convenient height for a workman to see the cloth as it is going into the machine, and be within reach when passing through the machine; and at the same time it is desirable that the cloths should pass downwards and pass under the machine; and in order to accomplish these objects, I have so arranged the machine that the scray or surface *m*, *m*, on which the cloth moves, passes below the floor on which the machine is placed, and on which the workman stands when attending his work; by this arrangement and mode of applying the scray, or such like surface, I obtain great facilities in carrying on the operation of raising the pile of woollen and other cloths.

And I would remark, that this part of the invention is equally applicable in double or single machines, and whether both gig cylinders revolve at the same time or not. The dotted line indicates the course of the cloth under operation; *n*, *n*, are two rollers, over and under which the

cloth passes before coming to the front gig cylinder; and these rollers can be varied in their position by the necks or axis, which carries the frames n^1, being placed more vertical or horizontal, and set in any position by means of set screws, which are turned by the handles n^2; and the cloths in passing over the front gig cylinder will be caused to bear on more or less of the surface of that cylinder, according as these rollers n, are raised or lowered, by means of the cog wheels o, on the axis o^1, such cog wheels taking into and working in segment or curved racks o^*, which carry the axis of the frame of the rollers n; and o^2, is a plate on one end of the axis o, which has a click or catch o^3, by which the axis o^1, can be held in any desired position; and such is consequently the case in respect to the rollers n, n.

The axis o^1, being turned round by means of the cranked handle o^4, as will readily be understood by examining the drawing, from the front gig cylinder, the cloths pass partly around the rollers p, and q, which receive motion by means of a cog wheel, affixed on the left-hand end of the axis of the front gig cylinder, which takes into and drives the intermediate cog wheel p^1, which drives the cog wheel p^2, mounted on the axis of the roller p; and the rollers p and q, are geared together by means of cog wheels on their axis, as is clearly shewn in the drawing.

The cloth from the front gig cylinder passes over certain apparatus for cross raising of the pile, as hereafter explained, and then under the roller r, which is capable of being raised or lowered by similar apparatus to that described in respect of the rollers n, as above described; and cloth from the back gig cylinder is conveyed off by means of similar rollers p, and q, to those before described; and the rollers p, and q, of the back gig cylinder receive motion by means of a shaft or axis s, actuated by means

of a bevelled toothed wheel affixed on the axis of the roller *p*, to the front gig cylinder, such bevelled toothed wheel taking into and driving a similar bevelled toothed wheel on the axis *s*, and in like manner by two bevelled toothed wheels, one on the axis *s*, and the other on the axis of the wheel *p*, of the back gig cylinder, all which is clearly shewn by the drawing of the right-hand side of the machine.

The patentee then describes the apparatus for cross raising, which may or may not be used, according as the workman judges it desirable; and he remarks,—I am aware, that it is not new to cross raise cloths in a gig mill; and this part of my invention only relates to the application of suitable means of adjusting the pressure of such cross raising, in order to allow for the extra thickness of the selvages in respect to other parts of the cloth.

The machine is arranged for two widths of narrow cloths to be passing through the machine at one time, side by side; and there are therefore four endless bands or straps of wire cards, one for each selvage; but if broad cloth were being operated on, only two endless bands or straps of wire cards would be necessary, or the four may be employed; and in such case, only the outer ones would be adjusted to act suitably on the selvage. *t*, *t*, is a frame of four parallel bars, which carry four frames, each frame having two rollers *v*, moving on axes, one to each frame, passing through the bars *t*, and become the driving axis of their rollers, and the points on which the frames v^1, are raised and lowered, as is shewn in the drawing; the other axis being carried by their respective frames v^1; and on the rollers *v*, move endless bands of wire card; and, in consequence of the frames v^1, being capable of movement up or down on their driving axis, the other ends of those frames v^1, can be raised or lowered, or be kept level, according as desired. *u*, is a shaft or axis receiving rotary

motion from the axis *s*, by means of a bevilled toothed wheel *w*, affixed thereon, which takes into and drives a bevelled cog wheel *x*, that turns on a suitable axis, carried by the right-hand end framing; and to the wheel *x*, is fixed a cog wheel *y*, which takes into and drives a cog wheel *z*, on the axis *u*; and on the axis *u*, are two bevelled toothed wheels, taking into and driving similar bevelled toothed wheels, affixed on the axis of some of the rollers *v*, as is clearly shewn in the drawing, at fig. 6.

The endless bands or straps of wire cards (which should be of cards, with India-rubber backs, affixed on leather or other suitable endless straps or bands) move on guides, beds, or platforms, on the surface of the frames v^1, which can be raised or lowered as follows:—v^2, are excentrics under the frames v^1, which are capable of being turned round on their axis; and their axis have each a screw wheel v^3, which receives motion by means of axes or shafts v^4, proceeding to the outer ends of the frame *t*; and the axes v^4, have each a screw v^5, which takes into and drives its respective wheel v^3. By this arrangement, it will be evident that, supposing the narrow breadths of cloth are passing through the machine, the ends v^6, of each of the frames v^1, can be raised out of the true horizontal line, and thus cause the endless bands of wire cards to act only at and approaching to the selvages; and as the frames v^1, can be raised, more or less, at the pleasure of the workman, the endless bands of wire card may be made to act upon a small portion near the selvages, or to operate upon the whole breadth of the cloth; but, in case of broad cloth passing through the machine, the two inner bands of wire cloth would work horizontally, and only the outer ends of the other two bands be elevated to take the selvages; and in case of using only two endless bands, they must be of a

length sufficient to respectively operate on one half of the width of the cloth.

In conclusion, the patentee states:—Having now described the nature of my invention, and the manner in which the same is to be performed, I would remark, that I make no claim to any of the parts separately nor combined, other than is herein particularly claimed, as of my invention; but what I claim is, first, the mode of more equally damping cloths by machinery, to facilitate and equalize the process of raising the pile on woollen and other cloths, as above described; secondly, I claim the mode of combining two gig cylinders, one behind the other, when so arranged as to work at the same time, as above described; thirdly, I claim the mode of applying the scray or surface, on which the cloths, under operation, move, by causing it to be below the level of the floor, as above described; fourthly, I claim the application of suitable apparatus for cross raising between two gig cylinders; and I also claim the application of suitable apparatus to regulate the position of such cross raising apparatus, in order to accommodate the same to raising the selvages, as above described, however such apparatus, or cross raising, may be employed.—[*Inrolled in the Inrolment Office, February,* 1840.]

To William Bates, *of Leicester, fuller and dresser, for his invention of improvements in the process of finishing hosiery and other looped fabrics.*—[Sealed 4th June, 1839.]

The patentee states:—My invention relates to certain modes of finishing hosiery and other looped fabrics, known

by the names of lamb's wool, worsted, Angola, and cotton, by the means hereinafter mentioned and explained.

According to the ordinary process pursued previous to my former patent, Angola and cotton goods were finished by being submitted to a process of ironing by hand; lamb's wool goods were not usually either ironed or pressed, but if occasionally they were pressed, it was without having legs or shapes inserted into them; worsted goods were usually pressed, but not upon legs or shapes; and rough or undressed goods were generally merely put upon legs, and exposed to heat by means of a stove, to give them size and shape. And in my former patent I did describe a certain mode of finishing goods made of elastic stocking fabric, and known by the name of lamb's wool, worsted, and Angola, by placing within them legs or other shapes, according to the nature of the articles to be operated on, and in that state submitting the fabric to the hot pressure of any suitable surfaces, produced by the heat of fluids; and I have since discovered that pressure, under such circumstances, that is, having shapes or forms inserted into the articles to be pressed, is beneficial, even though the surfaces are not heated; and one part of my present invention relates to the pressing such Angola, cotton, worsted, and lamb's wool knit or looped fabrics, with suitable shapes or forms within them, and whether rough or dressed, by the aid of flat or other pressing surfaces, worked by screw or other presses; and in performing this part of my invention, supposing the articles to be finished, according to this part of my invention, to be stockings, each stocking has a thin flat leg, or shape of wood, or other suitable material, inserted into such stocking; in this state they are to be submitted to pressure, in a similar manner to that described in my former patent; but the operation takes longer time, that is, from ten to fifteen minutes, or more; and in case rollers

be used as the press, then it is desirable to pass the articles through several times, or by a very slow movement.

At the same time I would remark, that I do not consider rollers so good a description of press as the various kinds of presses having flat surfaces. I have mentioned stockings as the articles to be treated or finished. I would however remark, that the same description applies to other articles; and the only difference is the flat shapes or forms of wood, or other suitable material, put into the article to be treated or finished, according to this part of my invention; by this mode of working, I dispense with the application of heat.

Another part of my invention relates to the application of heated shapes, legs, or forms, in the finishing of stockings or other knit or looped goods of lamb's wool, worsted, Angola, or cotton, and subjecting such stockings, or other knit or looped goods of lamb's wool, worsted, Angola, or cotton, to pressure whilst they are inserted on such heated shapes, legs, or forms; and the same is performed by heating the flat legs, or other forms or shapes, before inserting them into the stockings or other articles to be finished by this process, and such heating may be performed in any suitable manner.

I have found, that any degree of heat which will not burn or cockle the articles under operation, quickens and improves the process of pressure when using legs, forms, or shapes, within the articles operated on; and the best means I am acquainted with for heating the legs, shapes, or forms, consists of an oven or such like vessel, heated by means of steam of fifteen to twenty pounds on the square inch, though other apparatus or means may be resorted to.

My invention not relating to the modes of heating the legs, forms, or shapes, inserted into the knit or looped articles of lamb's wool, worsted, Angola, or cotton, but to

the application of such heated shapes, legs, or forms, in the finishing of such descriptions of goods; and having inserted such heated legs, forms, or shapes, into the goods to be pressed, I place them between two surfaces of a press; and I prefer placing them in single layers, using, by preference, flat surfaced presses; and where more than one layer is placed in a press at one time, it is desirable to place, between each layer, a smooth sheet of millboard, or other suitable material, in order to keep the layers separate; and in case no such millboard or other material be placed between the layers, then it is desirable to have the goods placed on the legs, forms, or shapes, with the outside towards the legs, forms, or shapes, particularly where great pressure is required; and by this means, and submitting the goods to pressure, as above described, for from three to ten minutes, according to the extent of finish desired, a very beneficial operation of finishing will be obtained.

Another part of my invention relates to other means of applying heat in the process of finishing knit or looped fabrics of lamb's wool, worsted, Angola, and cotton, when the articles are placed on legs, forms, or shapes; and consists of employing heated surfaces produced by the heat of fire or flame, or by heating surfaces with fluids, without such fluid being in contact therewith, or contained therein; and in place of employing heated surfaces containing hot fluids, as was the case in my former patent; and in order to give the best information in my power as to this part of my invention, I will proceed to describe the means pursued by me, and which I believe will be found, in practice, the best for performing this part of my invention. And I would first remark, that the legs, shapes, or forms, inserted into the goods, may be heated or not when performing this part of my invention; and I prefer, that in place of heating the surfaces of the press itself, to employ flat plates of

copper or iron, or other suitable material; and in case of iron, I put sheets of millboard between the goods and iron plates, which, being heated, are to have a layer of the goods, with legs, shapes, or forms, inserted therein, as above explained. And I prefer having the goods in single layers, placed between two such plates, and then the plates and the goods between them placed in any suitable press, preferring those with flat surfaces, and thus submitted to pressure from three to five minutes; and it should be stated that, in heating such plates, care is to be observed not to heat them to such an extent as would burn or cockle, or otherwise injure the fabrics; and I usually employ iron ovens, heated by the direct action of fire, or the same may be heated with steam or other fluid. In case it be preferred to heat the surfaces of the press itself, this may be done by having suitable openings in such surfaces, to receive burning charcoal or hot irons, or gas, which, being previously heated, are to be placed in the hollow surfaces of the press; and in case rollers be used as the pressing means, then the same should be formed with suitable hollow axes to receive heated iron or gas, thereby to heat the pressing surfaces of the rollers; but, I would remark, in respect to this part of my invention, that I prefer to use plates separately, heated by any convenient means, and to place between each two of them a layer of the articles, having legs, shapes, or forms inserted therein, and submitting them, in that state, to the action of any suitable press or pressure; and I prefer placing millboard between the articles and the plates.

The object of the present invention being the employment of suitable heated surfaces, heated by any other means than hollow surfaces, heated by steam, hot water, or other fluids, when such employment of heated surfaces is combined with the employment of legs, shapes, or forms

inserted in the articles undergoing the finishing process. It should be remarked, that in treating or finishing knit or looped Angola goods by hot pressure, it is desirable that they should be placed on legs, shapes, or forms, in a damp state.

Another part of my invention relates to submitting knit or looped fabrics of lamb's wool, worsted, Angola, and cotton, when on legs, shapes, or forms, to the action of steam, whereby the character and appearance of such goods will be improved; and in order to perform this part of my invention, having placed a number of stockings on legs or drawers, shirts, waistcoats, gloves, or other articles, on proper shapes or forms, I place them in a suitable chamber, which will contain steam; and I either suspend them in such chamber, or have a series of open shelves, on which the articles are laid; and I prefer placing them in single layers, and in this state allow them to remain, in what may be called a steam bath, for about three minutes, and then immediately press them whilst they are hot and damp from the action of the steam, or I permit them to dry on the legs, shapes, or forms, and in some cases without pressing them at all. The steam I use is five pounds pressure on the square inch; the chamber or bath being provided with an outlet to run off the condensed steam. The steam chamber I prefer to be quadrangular, sufficiently strong to resist the pressure employed; and having a door or opening readily removed, in order readily to place in and remove the goods, and yet sufficiently steam tight to waste but little steam.

Having thus described the nature of my invention, I would have it understood that what I claim is, first, the mode of finishing knit or looped fabrics of lamb's wool, worsted, Angola, and cotton, when on shapes or forms, by means of pressure, without heat, as herein described;

secondly, I claim the mode of finishing knit or looped fabrics of lamb's wool, worsted, Angola, and cotton, by means of pressure, when on heated shapes, as above described; thirdly, I claim the mode of applying heated surfaces, in combination with the employment of legs, shapes, or forms, when such heat is obtained to the surfaces by any other means than by steam, hot water, or other fluids circulating in the hot pressing surfaces, as above described; and fourthly, I claim the mode of treating knit or looped fabrics of lamb's wool, worsted, Angola, and cotton, when on legs, shapes, or forms, by means of a steam bath, and either with or without pressure, as above described.—[*Inrolled in the Inrolment Office, December,* 1839.]

To JOHN HANSON, *of Huddersfield, in the county of York, leaden pipe manufacturer, and* CHARLES HANSON, *of the same place, watch-maker, for their invention of certain improvements in machinery or apparatus for making or manufacturing pipes, tubes, and various other articles, from metallic and other substances.**—[Sealed 31st August, 1837.]

THIS invention of certain improvements in machinery or apparatus for making or manufacturing pipes and tubes from metallic substances, applies to the machinery or apparatus for making or manufacturing pipes and tubes from lead or tin, or a mixture or compound of lead with other metals, as tin or zinc, or any other com-

* The Patentees have entered a Disclaimer to part of the Title, which, being altered, now reads as follows :—"*Certain improvements in machinery or apparatus for making or manufacturing pipes and tubes from metallic substances.*"

pound or alloy of soft metals, capable of being squeezed or forced by means of great pressure from out of a cylinder or receiver, through or between apertures, dies, and cores, when in a solid state, described and set forth in the specification of a patent granted to Thomas Burr, of Shrewsbury, dated the eleventh day of April, one thousand eight hundred and twenty.

And the said improvements consist, firstly, in the arrangement, construction, and application of a short fixed or stationary core, for determining the inner diameter or bore of the said pipes or tubes, in contra-distinction to the long moveable core, as described in the specification of the said Thomas Burr, which long core, in his machinery or apparatus, is attached to the piston of the cylinder, and is liable to warp and twist out of the straight line, and out of centre with the dies, from the difference of expansion and contraction of the metal, under different degrees of temperature, pressure, and other causes; secondly, in an improved mode or method of arranging, constructing, adapting, and adjusting the dies or apertures, which determine the outer diameter of the said pipes and tubes, for the purpose of enabling the workman easily and readily to bring the same central with the core, when applying a fresh set of dies and cores to the cylinders, in order to make pipes of different sizes, or in case the same should get out of their relative true positions from any other cause; thirdly, in the arrangement, construction, and adaptation of the said improved parts or mechanism, by which we are enabled to make two, three, or more lengths of pipes or tubes, at one and the same time and operation; fourthly, in the application of a fixed guide-piece, cross-bar, or bridge, placed near to the dies or apertures, at the end of the cylinder, for the purpose of guiding and conducting a long moveable core attached to the piston, and keeping

it central with the dies, when such kind or construction of core and machinery is used for making pipes and tubes, such moveable core or rod passing through the said guide-piece, cross-bar, or bridge. By means of which several improvements, we are enabled to work the said machinery or apparatus in a different position to Thomas Burr's machinery, and obtain great facility in such manufacture. Our improved machinery or apparatus being placed so as to discharge its pipes or tubes downwards, instead of upwards, whereby the necessity of filling the cylinder with melted metal through the dies themselves, or through apertures, made for this purpose, in the solid end of the cylinder, is obviated; such apertures, when so used, requiring to be afterwards stopped with plugs or screws.

The cylinder or receiver of our improved machinery being filled at the opposite end to that in which the die and core are placed, by pouring melted lead or soft metal therein through an aperture made in the side of a cylinder directly under the piston, when the die and the piston are at the greatest distance apart, (as shewn in fig. 17,) the said aperture being closed as it passes the piston; and further, we are enabled easily to apply oil or other lubricating materials to the dies and cores, or other parts, situated at the bottom of the cylinder, previous to pouring in a fresh charge of material; and lastly, in an improved arrangement and construction of piston, adapted to the cylinder used in the said process or manufacture of pipes or tubes, all of which improvements will be better understood by referring to the accompanying drawings, which are several sectional and detached views of the cylinder, and various parts drawn upon a large scale, and to which I shall now refer.

Plate XV., fig. 1, is a vertical section of the lower portion of a cylinder, with the piston shewn therein, and

also our improved construction and adaptation of a short core, with the dies applied thereto; fig. 2, is a horizontal section of the cylinder, taken in the line *a*, *b*, in fig. 1, or just above the cross-piece or bridge-piece core and die; fig. 3, is another similar partial section of the same, taken in the line *c*, *d*, in fig. 1, or just below the cross-piece, for the purpose of shewing the die more clearly; fig. 4, is a plan view of the die detached, shewing the situation of the core within the aperture; fig. 5, is a detached side view of the short fixed core and its cross-piece or bridge; and fig. 6, is a plan view of the same. A, A, is a portion of the cylinder; B, the piston rod, which is fixed or stationary in the head of the strong frame-work of the apparatus; C, is the piston attached to the rod, the various parts or details of which are shewn separate at figs. 13, to 18, inclusive, and will be described hereafter; D, is the end or bottom of the cylinder to which it is firmly attached, and also to a strong hollow pillar, table, or platform, placed on the top of the usual hydraulic ram; E, is the die which is fitted into the bottom of the cylinder, in a recess or cup, as shewn in the drawings; F, F, are adjusting screws, for setting or regulating the situation of the die as regards the core; G, is a thin steel plate, fitted very accurately into a cup or recess in the bottom of the cylinder, for the purpose of preventing the lead or other set metal getting between the edges of the die and the inner diameter of the recess or cup, and also to the adjusting screws, the threads or worms of which would otherwise become clogged; H, is the short fixed core or mandrill, which is properly fitted into the cross-piece, bridge, or holder I, I, which is also accurately fitted in another or larger recess in the bottom of the cylinder, such recess being formed above the one in which the die is placed.

The operation of making or manufacturing pipes or tubes, is as follows:—After a die and core of the required diameter have been applied to the bottom of the cylinder, and properly adjusted, the cylinder and other parts being lowered, a charge of lead or other soft metal is admitted through the aperture, at the side of the cylinder, immediately under the piston, from a pot or reservoir, containing melted metal, and as soon as this metal is *set* or become hard or solid, and before it becomes cold, the power of the hydraulic press is set in action, and as the hydraulic ram, hollow pillar, table, cylinder, or lead holder, with its bottom, fitted with its core and die, rises upward, the feeding aperture is first closed by the stationary piston, and when this is effected, the metal is forced in the direction of the arrows in fig. 1, between the arms of the cross-piece, bridge, or holder I, into the cup or recess in the bottom D, and thence through the space between the internal diameter of the bore of the die E, and the outer diameter of the core H, leaving the cylinder in the form of pipes or tubes, the size of which is determined by the diameter of the die or core. The tube or pipe is wound upon drums or reels as fast as it is discharged from the machinery.

The set metal is represented in the drawings by a tint of red color.

I may here remark, that it might be supposed that the metal being divided in its descent by the four arms of the cross-piece I, into four parts, would not unite together again at the point of entering the space between the die and core; but practice proves the contrary, as the metal leaves our improved apparatus as perfect, solid, and compact pipes or tubes.

Fig. 7, is another vertical section of the lower part of a cylinder, shewing the novel arrangement, construction,

and adaptation of our improved mechanism, as adapted and arranged to make four different lengths of pipes or tubes from one cylinder at the same time. Fig. 8, is a partial sectional plan view of the same, taken in the line *g, h,* in fig. 7. Fig. 9, is a horizontal section or plan view, taken at the line *e, f,* the plate H, being removed. Fig. 10, is another horizontal section, taken through the dies and cores in the line *a, b,* in fig. 7. Fig. 11, is a plan view of the bottom of the cylinder, the dies and cores being removed to shew its construction. Fig. 12, is a side view of one of the cores detached. A, A, is the cylinder; B, B, the bottom of the same; C, C, are the dies, the bores or apertures of which are, in this instance, placed in a horizontal position; D, D, are the screws for properly adjusting the horizontal situation of the dies as regards the cores or mandrills; and E, E, are wedges for adjusting the vertical position of the dies to the cores; F, F, are the cores or mandrills fixed into or forming part of stocks or pieces of metal G, G, which are morticed into one another, and also into the bottom of the cylinder, as shewn in the drawings, and thereby securely retained in their proper situation. The arrows indicate the course of the metal as it passes out of the cylinder in the form of tubes or pipes, which is also shewn in the other figures; H, is the thin steel plate, having four apertures formed in it, corresponding with the wells and recesses formed in the bottom of the cylinder, which steel plate is placed on the top of the dies to prevent the access of set metal to the adjusting screws; and I, I, are other plates placed in front of the dies for the same purpose, and to prevent its access to the wedges. The bottom of the cylinder has four wells or recesses K, K, formed in it, as shewn more particularly in fig. 11, to allow of the passage of the set metal to the different dies and cores.

Fig. 13, is a representation of the end of the piston rod, shewn detached from the cylinder, with our improved construction of piston attached thereto. Fig. 14, is a similar representation, with the parts of the piston detached, which are shewn separate at figs. 15, 16, 17, and 18. *a*, is the piston rod; *b*, the lower end or butt of the piston, attached to the rod by the pin *c*; *d*, is the upper part of the piston; between the inclined or conical shaped sides of the parts *d*, and *b*, is placed the ring *e*, shewn detached in plan at fig. 17, and in section at fig. 18; the sides of this ring are also inclined or conical shaped, and it is cut or severed, by means of a saw, in the direction shewn by the line *f*, *g*, in fig. 18, and consequently it will be obliged to expand, and keep the piston tightly packed with the cylinder under great pressure, and thereby prevent the escape of metal past the piston. The piston is attached to its rod *a*, by means of a pin *h*, passed through it and the pin *c*, or in any other convenient manner.

Fig. 19, is a vertical section of a cylinder and piston, shewing our last improvement applied thereto, (videlicet,) the application and adaptation of the guide-piece, or cross-piece, or bridge, through which the long core or rod, attached to the piston, passes for the purpose of keeping it central with the die. A, A, is the cylinder; B, the piston rod; C, the piston; D, the bottom of the cylinder; E, the die; G, the thin steel plate; F, the adjusting screws; H, the long core or rod attached to the piston C, and travelling with it, passing freely through the guide-piece, cross-piece, or bridge I, I, which has a proper shaped hole bored through it for this purpose, consequently keeping the core at all times steady and central with the die; K, is the aperture for supplying the cylinder with melted metal.

And we would here remark, that we wish it to be understood, that we do not mean or intend to confine ourselves

to the mode of operation herein above described, by making the cylinder rise with the hydraulic ram and other parts, and keeping the piston stationary, as the same operations and effects will take place when the cylinder is fixed or stationary, and the power of the hydraulic ram applied to the top of the piston rod to cause it to descend into the cylinder; nor do we confine ourselves to the making or forming the cross-piece or bridge, which holds or guides either the short or long cores with four arms, as it may be made with one, two, or three arms, all of which variations will readily suggest themselves to any practical engineer, without departing from our invention.

Having now particularly described and ascertained the nature of our improvements, and the manner of carrying the same into effect, we would remark, that we do not mean or intend to claim any of the parts of the cylinder or piston rod, or the manner of fitting them up in the frame-work of the press or machinery, nor the mode or method of connecting them to one another, as none of them are new; and they may be varied and fitted up in different ways to suit different arrangements of machinery.

Our invention or improvements, as above stated, and set forth in the commencement of this specification, being, firstly, in the arrangement, construction, and application of the short fixed core H, for determining the inner diameter of the pipes or tubes; secondly, in the improved mode of constructing, adapting, and adjusting the dies or apertures, which determine the outer diameter of the pipes or tubes; thirdly, in the adaptation of the said improved parts, by which two, three, or more lengths of pipes or tubes can be made at one and the same time and operation; fourthly, in the application of the fixed guide-piece I, for the purpose of guiding a long moveable core or rod, when attached to the

piston, and keeping it central with the dies; and lastly, in the improved piston c, of the cylinder, for making such pipes and tubes.—[*Inrolled in the Rolls Chapel Office, 28th February*, 1838.]

Specification drawn by Messrs. Newton and Berry.

To William Newton, *of the Office for Patents*, 66, *Chancery-lane, in the county of Middlesex, civil engineer, for an invention of certain improvements in the construction of sun-dials, designed to shew mean time,—being a communication from a certain foreigner, residing abroad.*—[Sealed 27th June. 1839.]

These improvements in the construction of sun-dials, designed to shew mean time, consist in certain machinery, on which the plate and gnomon of a sun-dial is to be mounted, for the purpose of adjusting the position of the dial-plate according to the varying difference between solar time and mean time, in order that the dial, on being so adjusted, may, when the sun shines upon it, exhibit the real or mean time of the day instead of the solar time.

The accompanying drawings represent the improved modes of mounting sun-dials. Fig. 1, Plate XVII., shews, in perspective, the most simple construction of the apparatus, as it would appear when complete and in operation. Fig. 2, is a geometrical elevation of the same, taken on one side.

The apparatus may be said to consist of two distinct parts, the one fixed called the stand, intended to be made fast to a firm base; the other moveable, called the saddle or easel, which carries a moveable dial-plate. The stand

is, in some respects, formed as a skeleton reading desk of frames and rails connected together, as shewn detached in perspective at fig. 3.

There are three quadrilateral frames made of metal, two of which, A D B E, A D C F, being square and of equal dimensions, are united at right angles in the line A, D, and are maintained by the third or horizontal frame B E C F, which serves as a basis for them both.

Rails G H, G I, are fixed in the quadrilateral frames A D B E, A D C F, crossing the middle of each frame, parallel to their sides. These two rails, united at their junction *g*, are at right angles to one another. At the bottom of the rail G I, is a pivot L, and on the prolonged end of the rail G H, is fixed another pivot K; the axis of these pivots is parallel to the rail G I, and they are intended to receive the two bushes or arms, by which the *saddle* or *easel* is suspended. The plane of the two rails G H, G I, must be placed in the direction of the meridian, the rail G I, standing towards the south, if the dial is to be adapted to any northern latitude. Fig. 3*, is a bird's-eye view of the stand, drawn geometrically.

Four screws *l, l, l, l,* passed through the ends of the base frame B E C F, are for the purpose of accurately adjusting its level upon the pedestal or base, on which it is to stand; and the graduated sector, attached to the side of the frame D E, (see fig. 1,) with its plumb line, will afford the means of accurately determining the level, the pedestal or base being previously constructed so as to have a sufficient inclination to compensate the difference existing between the latitude of the place and the angle of 45 degrees, which forms the natural inclination of the rail G I, to the base frame of the stand.

The stand being thus properly set, the rail G I, will be parallel to the axis of the earth, the plane of the two rails

G H, G I, will be in the plane of the meridian, and the quadrilateral frame A D B E, will be parallel to the plane of the equator; and indeed they may be said to represent those imaginary planes.

The saddle or easel, shewn detached in perspective at fig. 4, is formed of two quadrilateral frames of metal N Q M T, N Q R S, of equal dimensions, united at right angles in the line N Q, and supported by a metal rail O P, fixed to the middle of the sides M T, and R S, and forming an angle of 45 degrees with each. This rail O P, carries near each of its extremities an arm or tenon U U, with a hole bored through, forming two bushes or rings for suspending the *saddle* or *easel* on the two pivots K and L, of the stand, (fig. 3). The lower bush is the only one of the two which bears on the boss of its pivot L; the upper bush merely holds up the saddle or easel by the upper pivot K.

The gnomonic graduated plate of the sun-dial, shewn at fig. 5, is to be fixed on the saddle or easel in a horizontal position by two screws *i*, *i*, so that the edge of the gnomon or style *e*, *t*, will be exactly parallel to the rail O P, or more properly speaking, to the axis of suspension, passing through the two bushes U U. This condition of perfect parallelism is essential, without which the dial cannot have the precision and exactness required in the various positions which it is to assume to indicate accurately the mean time.

In the rail G H, on the face of the quadrilateral frame A D B E, (shewn also detached at fig. 6,) a pivot Z, is fixed, upon which a metallic toothed wheel K K K, turns freely. This toothed wheel has a graduated circle on its face, divided into 365 parts, equal in number to the days of the year; and upon this circle are engraved the names of the months, and the necessary numbers for indicating the days of each month.

Only 365 divisions are made, although there be a 366th

day in the leap year; but this extra day, introduced every fourth year, and constituting the 29th of February, amounts only to about six hours every year; the neglecting of which occasions a very slight difference between the *mean* time and the *real* time, which can never cause an error of more than a few seconds, quite imperceptible on a dial of ordinary dimensions.

On the middle of the toothed wheel is fixed an excentric plate or cam *m*, called the governor, the edge of which is curved in such a manner that, with respect to each division of the circle of days, brought under an index or pointer, the said curve presents, for every day, a projection or difference of radius, corresponding exactly with the difference between the *solar* and the *mean* time. This plate or governor is also called the *curve* of the *mean* time.

The upper pivot K, of the rail G H, forms also a pivot for a bent arm *a, b, c, h, i, j*, to swing upon. To this bent arm is connected the upper bush of the *saddle* or *easel*, which carries the sun-dial,—see fig. 1. The bent arm forms a lever, by which the dial, with its saddle or easel, is occasionally moved in a vibratory direction, for the purpose of placing the dial plate, at a small inclination, out of the true horizontal plane. On the side of the bent arm, an adjustable screw bolt *g*, is inserted, which, by the action of a helical spring *p*, is brought against the curved edge of the excentric plate or governor, so that, as the plate is turned round, the bent arm or lever will be moved in pendulous directions, to and fro, upon the face of the graduated wheel K; and consequently, by its motions, give an undulatory movement to the dial plate, to which it is connected, causing the dial plate to incline from its horizontal position.

Fig. 7, represents, drawn on an enlarged scale, the bent arm or lever detached, with a portion of the excentric plate

or governor; and also a part of the toothed wheel, and of the lower rail of the rectangular frame B E; and fig. 8, is a side view of fig. 6, upon the same enlarged scale as fig. 7. Upon the rail B E, a plate Z Z, is screwed, in which there is a curved opening *x*, *x*. This opening *x*, *x*, allows a portion of the circle of graduations of days and months upon the face of the toothed wheel, to be seen. In the middle of this opening there is, attached to the plate, a small pointer or index *s*. The day of the month, for which the dial is to be adjusted, must be brought opposite to this index, by turning the wheel round, which may be done by means of a pinion having a milled head *w*, upon its axle, as seen at figs. 1 and 8.

Upon the plate Z, a segmental scale *y*, *y*, of graduations, is engraved, which represents minutes of time; the middle graduation, marked 60, being the point of no variation. Above, and corresponding with this scale, a sliding vernier, divided into seconds, is placed, which is moveable in a curved slot in the plate. This vernier is attached to the lower end of the bent arm at *i*, *j*, and its middle line represents mid-day.

When the dial has been properly stationed, as above described, that is, mounted upon its pedestal and adjusted to the latitude of the place, and the true meridian, the observer has to turn the toothed wheel *k*, until the day of the month in the circle of graduations upon the wheel is opposite to the index or pointer *s*; this will bring round the cam-plate or governor into such a position as will have caused the bent arm to advance or recede, according to the calculated equation of time for that day; which movement of the bent arm will move the saddle or easel upon its axis L K, and thereby incline the dial-plate a little out of its former horizontal position; and hence, (according as the sun may be before or after the true time,) the shadow

from the gnomon will fall upon the graduated plate, so much to the right or left of the line, which would give solar time, as will indicate the true or mean time on that day;—the scale and vernier shewing the difference between the solar and mean time, that is, the number of minutes and seconds which the time, as given by the sun, is before or after the true or mean time.

In the previous description of the dial-plate, as placed horizontally, the patentee has considered a dial suited to the latitude of 45 degrees, which was done merely as a matter of convenience, and for the purpose of simplifying the description; the place of observation, therefore, having greater or less north latitude, the base of the stand must be inclined accordingly, which will be perfectly well understood by those acquainted with the science of gnomonics.

A small plate spring may be necessary to bear against the face of the graduated wheel, to produce friction, and keep it steady.

The dial-plate may be placed either horizontally, as described, or vertically; or two plates, one vertically the other horizontally, may be adapted to the saddle or easel, (as shewn in fig. 2,) the former directions being carefully attended to.

If, instead of a dial of 45 degrees latitude, which is the most convenient, it be wished to use another dial for a different latitude, then, in order to accomplish the indispensable condition of parallelism between the style of the dial and the axis of suspension of the *saddle* or *easel*, a universal *saddle* or *easel* must be employed, which, instead of fixed branches, as the one above described, should be provided with moveable branches.

The universal *saddle* or *easel*, (fig. 9,) may be adapted to every dial, horizontal or vertical, and consists of three

distinct branches, united by hinge-joints, and shewn expanded at fig. 10.

The upper part of the frame, on which the dial-plate is fixed, has a hinge-joint at each angle T Q.

The rail O P, having its two tenons and bushes U U, and a screw *m*, *n*, which connects the frame, and forms part of the side Q P, may be lengthened or shortened at will, for the purpose of raising or depressing the edge Q, of the plate, in order that the *saddle* or *easel* may be enabled to receive any dial adapted to from 30 to 60 degrees of latitude. This universal saddle or easel may be applied to higher or lower latitudes, either by lengthening the uniting screw, or by shortening it, and substituting for the piece or plate *o'*, *p'*, a piece, shewn detached at fig. 11 and 12, which would allow the angle of latitude to be reduced to *nil.*

The general construction of the mechanism by which I propose to shift the inclination of the dial-plate, according to the time of year at which the observation is to be made, for the purpose of shewing true time upon a sun-dial; and the mode of adjusting the dial to the latitude of the places of observation being explained, it will be unnecessary for me to point out all the modifications which would be required when the dial-plate is not set at right angles to the meridian, as that will be understood by all those who are acquainted with dialing; and if the dial be adapted for countries lying in south latitude, it is obvious that the graduation of the wheel, and the general arrangement of the whole, must be reversed; this however will be also well understood. It is therefore only requisite, says the patentee, for me to say, that the subject matter of this invention, and which I claim under the above recited letters patent, is a mechanical arrangement, by which I am enabled to shift the position of a sun-dial, and thereby adjust

it for every day in the year, so that the shadow thrown upon the dial from the gnomon, when the sun shines, shall indicate, not the solar time as heretofore, but the mean or true time, as given by a well-regulated clock or other timekeeper.—[*Inrolled at the Rolls Chapel Office, December,* 1839.]

Specification drawn by Messrs. Newton and Berry.

To MOSES POOLE, *of Lincoln's-inn, in the county of Middlesex, gentleman, for an invention of improvements in introducing elastic materials into fabrics, to render them elastic or partly elastic,—being a communication.*—[Sealed 23rd August, 1839.]

THE improvements in the modes of introducing elastic materials into fabrics, to render them elastic or partly elastic, relate first to a mode of introducing strands or threads of India rubber or fine metallic wire, twisted in a spiral form of spring, and such strands or threads of India rubber and the wire springs, may be either coated or wound round with a filamentous material or not, by braiding, twisting, or other process of covering internal threads, as is well understood, and in general use, such introduction of threads of India rubber or of wire springs, being made in a transverse direction, across the fabric, which is being made in the machinery, commonly called warp lace machinery, which, as is well known, works by means of interloping a system of warp threads into each other. Secondly, the improvements relate to a mode of producing fabrics in the machine, commonly called stocking-frame or knitting machinery, by making certain welts or tubes, transversely, of the fabric, by the working of the machine, in order to retain or

strengthen the elasticity in the transverse direction, in the whole or at certain parts of fabrics made, or that the fabrics may, in such tubes or welts, have threads or bands of India rubber or other elastic materials, either covered with filamentous materials or not, laid or drawn into them. Thirdly, the improvements relate to a mode of running covered stands or narrow bands of India rubber or of wire spring into knit and looped fabrics, and into leather and other gloves, by making eyelet holes where it is desired to have parts of garments more or less elastic, and running such elastic materials through such holes.

Having thus stated the general nature of the invention, I will proceed to explain the best means I am acquainted with for carrying out the invention:—Warp lace machines and stocking or knitting machines or frames, being well known, I shall only refer to the working of those parts of the respective machines which are necessary to facilitate the understanding of the invention, the first part being carried out upon the warp lace machine, that machine being furnished with its compliment of threads, conducted from the warp beams or bobbins, in the usual manner, through guides to the needles, as is well understood; and all parts being in working order, I will suppose the machine as standing in the position, of what is technically expressed, at the end of a course. In again putting the machine in action, the sinker bar will move forward, and the arches of the sinkers will take over the work; they then recede, carrying with them the work already made to the back of the needles, and with the work the warp threads, (which are under the needles); and on the top of the warp threads and under the needles, a thread or threads of India rubber or other elastic material, either covered or wound round with a filamentous material or not, is or are to be laid in, and in such manner as to be shut

in, when the warp threads are again lapped over the heads of the needles, in order to form the next row of loops, and thus fasten the transverse threads of elastic material into the fabric. The sinkers now advance a little distance for the purpose of bringing the work forward upon the shafts of the needles, and the new loops under the beards of the needles. The presser bar then descends on the beards of the needles and rises again, when the sinkers advance, bringing the work further forward over the heads of the needles; the elastic threads or bands are now shut into the fabric, and the operation of forming the stitches or loops of the fabric goes on in the ordinary way, repeating the introduction of transverse elastic materials, as often as desired. And it will be evident, that such transverse threads may be varied from elastic to non-elastic, and laid in at every course, or every other course or more, as necessity will direct. And it will be evident, that if threads of silk or cotton, or other fibrous materials, be so used, they will prevent the elastic material being stretched too far. When India rubber is introduced, it is in the stretched or non-elastic state, and elasticity is obtained thereto, (when the work is taken out of the machine,) by means of heat, as is well understood by persons working with India rubber; but it is not necessary that the India rubber should be in the non-elastic state, as by keeping India rubber, (when introduced in the elastic state,) stretched to the desired extent, till it is shut into the fabric, the desired effect will be obtained. From the foregoing description, a workman will readily introduce elastic materials into the warp fabrics transversely across the needles, and consequently of the fabrics, as the same is in the progress of manufacture.

The second part of the invention being performed in the stocking or knitting machine or frame, I will suppose the

stocking, glove, or other knitted fabrics, requiring to be made according to this part of the invention, to be began, and a small quantity made in the usual way, and hanging on the fronts of the needles,—I make a slack course in the fabric, by letting the jacks fall lower than usual; the working of the machine is then continued, either slack or tight as before, for small courses, until there is sufficient to make a welt pipe or tube of the size desired. I then take up the first slack course, previously made, and pass it over the needles, as is well understood, bringing the work again to the front under the beards of the needles. I then press the beards into the needle eyes, while the work is knocked over or from the heads of the needles. The work is then continued in the same manner, welt after welt, to the extent desired, and then worked in the ordinary way, to the extent required.

I would here remark, that I believe slack courses are the best for looping on to the needles, to produce welts or tubes, although other means may be resorted to, as is well understood, when making welts for selvages; and I would also remark, that by this means, any number of welts or tubes may be made;—thus, for instance, supposing the article, being made in a stocking machine, to be a stocking, and it is desired to strengthen the elasticity, natural to such looped fabrics, above and below the knee:—in such case, when the work is commenced at the top of the stocking, and the ordinary welt or selvage has been made, there is then to be made one or more welts in close succession, according to the degree of strength of elasticity desired, and whether it is intended to run India rubber or wire spring into such welts or tubes; then the stocking is proceeded with and completed; or in case it be desired to have an additional strength of elasticity produced under the knee, then there is to be one or more welts or tubes

produced in the fabric at the required places; and I would also remark, that the elastic material, if used, may be laid in when making the welt or tube, or drawn in subsequently; by this mode of making various knit fabrics, any required elasticity may be obtained. There is another mode of making pipes or tubes in stocking or knit fabrics, for the purpose of receiving elastic bands or cords of India rubber or wire spring, and which consists in taking a tape or ribbon, either woven, knitted, braided, or otherwise made, and which should have open edges, so as they may be conveniently passed on to the needles, and fastened to the fabric in the stocking or knitting frame; and when one or more courses are made, to loop the other edge of the tape or band, in the same manner, on to the fabric, as before described, to fasten the welts or tubes; and by this means, tubes or pipes may be produced to any required extent, and in any part of the work, to receive elastic materials.

The third part of my invention relates to a mode of applying elastic strands or bands, by running them through holes formed through the fabric; such bands or strands being fastened at the two ends, by sewing or otherwise, will produce elastic bands to stockings, gloves, and other articles of dress, whether knit or otherwise made. Supposing it being intended to apply this part of the invention to stockings, gloves, or other fabrics, made in knitting frames or machines,—at such places as it is desired to produce or introduce elastic bands or strands, I cause the machine in working to produce a slack course at each place where an elastic strand or band is to be introduced; and when the fabric is taken out of the machine, I run in a strand or strands of elastic material, by means of a needle or bodkin, or other such instrument, and in this way any number of elastic strands may be introduced. When this part of the invention is to be applied to warp fabrics, I

cause the machine so to work as to produce a row or rows of holes, as is well understood by warp hands; and when the fabric is taken out, I run in one or more strands, according to the row or rows of holes made to receive them; and in applying this part of the invention to leather and other gloves, or other parts of dress, I apply the elastic material by punching holes in rows, and run therein bands or strands of elastic material to the extent required, fastening the ends by sewing or otherwise.

In respect to the third part of the invention, though I prefer that the holes should be made in the course of working,—when the fabric is a warp fabric or a knit fabric,—it will be evident, that the running in of strands of India rubber, by a needle, bodkin, or such like instrument, may be performed without such holes, by simply running in the strands under and over the fabric to the extent required, such process of running in of the strands of India rubber, properly covered with fibres, being performed when the fabric is finished by the machine, whether knit or warp fabric.

I would remark, that I am aware that elastic threads of India rubber have been introduced into fabrics while being made in warp lace machinery, in a longitudinal direction of the fabric, and a patent was taken by Mr. Dunnington for such invention.—And I am aware that elastic bands to knit fabrics have been made by introducing strands of India rubber into the work, as it is being made on the needles of stocking or knitting machines, and a patent was taken for such invention by Mr. Sievier.—And I am also aware that other modes have been resorted to for applying India rubber to various fabrics. by placing such India rubber in cases, and affixing such cases, by sewing or by cement to various parts of dress; but the cases have not been made in the machine in the process of making the

fabrics, which invention was the subject of a patent, granted to Mr. Hancock. And I am also aware that a patent was taken by Mr. Bedells, for an invention of applying elastic bands to knit fabrics; and there have or may have been other means of applying elastic materials in fabrics. And I mention these modes, in order to state that I make no claim to any other method of applying elastic materials in fabrics, than are herein described and particularly claimed.

And I would have it understood, that what I claim, is first, the application of elastic strands or threads, transversely of the fabrics when being produced in warp lace machines; secondly, the making knit fabrics, with a series of tubes or welts in the progress of making, in order to increase the strength of elasticity natural to the fabric, or to receive elastic bands or strands of India rubber or wire spring, as above explained; and thirdly, I claim the mode of introducing or running strands or bands of India rubber into gloves, stockings, or other parts of fabrics, after they are taken from the machine, as above described.—[*Inrolled in the Inrolment Office, February,* 1840.]

To WILLIAM WIESMANN, *of George-yard, Lombard-street, in the city of London, merchant, for his invention of improvements in the manufacture of alum.*—[Sealed 16th November, 1839.]

THIS invention is described as relating to a mode of manufacturing alum, by which the same may be produced free of iron and alkali, (or nearly so); and, in order to give the best information in my power, I will proceed to describe the process pursued by me:—

I take potters' clay, as free from iron as possible, and calcine the same to a moderate red heat, in order, as much as possible, to drive off all humidity. The clay so calcined is next to be ground to a powder, and to be placed in leaden pans, heated by a moderate fire, or by steam; and sulphuric acid (about 66 degrees by Beaumé) is to be applied in sufficient quantities that the acid may dissolve nearly the whole of the clay. I prefer that the whole should not be dissolved, as a saving of acid is thereby obtained.

The mass in the pans is to be stirred until it is dry, when boiling water is to be applied to dissolve the salt formed; and water is to be so applied till the whole of the salt is separated. The liquors thus obtained are mixed and placed in vats, and left therein till perfectly clear. A measured quantity of the liquor is to be tested with prussiate of potash, or other suitable material, to ascertain the quantity of iron contained in such measured quantity of the liquor; then the whole quantity of liquor being known, the quantity of iron therein may be obtained by calculation, and whatever be the weight of iron, the liquor to be operated on is found to contain, an equal weight of prussiate of potash, dissolved in water, is to be stirred into the liquor, when the prussic acid will take to the iron, and they together will be precipitated by this means; the liquor drawn off clear or filtered will be composed of sulphuric acid, alumina, and water; and in this condition may be used for the purposes of the arts; but when required to be crystallized, I reduce the liquor by quickly evaporating it in large leaden vessels, until a skin of salt forms on the surface, when the liquor is drawn into shapes, where it cools and crystallizes.

I would here remark, that I am aware that the clay, treated with sulphuric acid, has been employed in the pro-

cess of making alum; but the processes have been conducted in a different manner, requiring much time, and producing alum not so pure and concentrated. I do not therefore claim the same generally, when practised according to the means heretofore known; and although I prefer the employment of prussiate of potash for precipitating the iron, I do not confine myself thereto, as other materials may be used, such as the lixivium of blood, or sulphate of lime; but what I claim, is the mode of making alum from clay, as herein described, whereby the alum will contain much more alumine, and is free, or nearly free, from iron.—[*Inrolled in the Inrolment Office, March,* 1840.]

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 306, Vol. XVI.)

Feb. 11.

The President in the Chair.

"A Description of the Coffre Dam at the site for the new Houses of Parliament."
By Grant S. Dalrymple.

The works described are those which necessarily precede the erection of the main building. They consist of the coffre dam, river wall, and the foundations of the river front—according to the designs, and under the direction, of the engineers (Messrs. Walker and Burges) and Mr. Barry, the architect; the whole being executed by Messrs. Lee, the contractors.

The mud at the site of the works varied much in depth and

in consistency, but beneath it is a bed of red gravel and sharp sand, averaging 14 feet in thickness, laying over a stratum of stiff clay, into which the piles are driven to a depth of 2 feet. To facilitate the driving of the piles, a curved trench, 27 feet wide by 8 feet deep, was dredged in the line of the dam. The main piles of Memel fir, 36 feet long by 1 foot square, were then driven, leaving their tops 4½ feet above the Trinity high-water mark of ordinary spring tides. The waling pieces were then attached, and the outer sheet piles of whole timber, 36 feet long by 13 inches square, sawn square on all sides, so as to ensure the joints being close when driven and bolted to the waling. The inner sheet piles of half timber were then driven to the same depth as the others; the space above them was made up with horizontal pieces, bedded down to them, and and secured with bolts to the furring pieces inserted above the waling at each guage pile. The whole length of the dam was secured by diagonal braces, extending back to the old river wall, against which they were abutted. The outer and inner rows of piles were secured together by three rows of wrought-iron bolts, the lower being 2½ inches diameter, and the two upper rows 2 inches diameter. The whole of the piles being driven, the space between was cleared out down to the clay substratum, and then filled up with stiff clay mixed with a portion of gravel; a portion of the excavated matter was then laid on both sides of the dam to protect the piling from injury.

The first pile was driven on the 1st of September, 1837, and the dam was closed on the 24th of December, 1838. The extreme length of the coffre dam along the river face is 920 feet, and the ends return at an angle until they meet with and enter the old river wall, at a distance of about 200 feet from the face of the dam.

The excavations for the foundation of the river wall were got out in lengths of 50 feet, levelled to receive the footing courses, which were laid on a bed of concrete of a thickness varying from 1 foot at the north end to between 5 and 6 feet in the centre and south corner, where the substratum was loose and spongy. The

concrete was composed of 6 measures of gravel and sand to 1 of ground lime, from the lower stratum of the chalk formation. Along the face of the wall was driven a row of elm sheet piles, from 8 to 12 feet long by 8 inches thick, square sawed, so as to drive close, spiked to an oak wale, and the whole secured to the front by 1-inch wrought-iron bolts, placed at distances of 4 feet apart, stretching back 6 feet into the wall, and fixed by cast-iron washers bedded between the footing courses. The two bottom or footing courses of the wall are 11 feet wide, of York landing, 6 inches thick; on these are two courses of Bramley-fall stone, each 1 foot 3 inches thick, from which rises the stone facing of the wall, of Aberdeen and Cornish granite, in courses varying in thickness from 2 feet 2 inches at the bottom to 1 foot 7 inches at the top. The front is built to a curve of 100 feet radius, and is backed with brickwork, making the total thickness of the wall 7 feet 6 inches at the bottom, and 5 feet at the top. Counterforts, projecting 3 feet 4½ inches by 3 feet 9 inches wide, occur at intervals of 20 feet along the whole length. At a distance of 28 feet 9 inches from the back of the river wall is the foundation of the front wall of the main body of the building, the space between the two walls being filled up with concrete, composed of 10 parts of gravel to 1 part of ground lime. The total length of the river wall, at the present level of 2 feet 3 inches above the Trinity standard of high-water mark, is 876 feet 6 inches. The wings at each end, projecting 2 feet 3 inches before the face of the centre part, are 101 feet 6 inches long each, leaving a clear terrace walk, 673 feet 6 inches long by 32 feet wide, between the wings and fronting the river. The height of the wall from the bottom of the footing courses is 25 feet 9 inches.

The excavation for the wall was commenced on the 1st of January, 1839, and the building of it was commenced in March of the same year. The amount of the estimate for the dam and wall was £74,373.

"On Brown's Patent Hydraulic Level."
By A. F. Hemming.

This instrument, designed for ascertaining the relative heights of points not visible from each other, consists of lengths of water-tight flexible tubing, attached to each other by brass joints, and having glass vessels at each end. The vessels and tubing being nearly filled with water, the level of the water, as seen in these vessels at two points, whose relative heights are to be compared, will serve to indicate their positions, whatever may be the inflexions of the tubing betwixt the two vessels. Graduated rods are placed perpendicularly at the points of observation, and the lower vessel is raised, and the higher lowered, until the level of the fluid therein intersects the graduation of the rods. It is conceived that this level may be peculiarly useful in mines and excavations, and in fixing complicated machinery.

Captain Basil Hall briefly explained his views as to obtaining for lighthouses all the advantages of a fixed light, by means of refracting lenses in revolution.

The difference between a fixed and a revolving light is much in favour of the revolving light, as the light can be concentrated and great brilliancy obtained on any particular point at each succeeding flash;—by a fixed light being meant, one in which the light is visible on every side; and by a revolving light, one in which the light appears in periodical flashes. Fresnel's fixed light has only one-sixth the brilliancy of his revolving light. Fresnel's system consists in having a large central lamp with four concentric wicks, surrounded by eight lenses, each three feet diameter. The light is thus concentrated and thrown off in eight pencils, which, as they strike the eye successively, have very brilliant effect, and are visible at a great distance.

Captain Basil Hall's inquiries have been directed to ascertain whether the well-known superior brilliancy of a revolving light

could not be obtained for a fixed or continuous light; that is for one equally visible in all directions at the same moment. His idea was, that by giving a certain velocity of revolution to a series of lenses round a fixed light, as in Fresnel's arrangement, a continuity of illuminating power, equal almost in brilliancy to that of a slowly revolving light, might be produced. This he expected, would prove true, provided no intensity were then lost. He had erected some apparatus at the Tower, and determined the effect by experiment. The apparatus consisted of a fixed central light with a series of eight lenses, 1 foot diameter and 3 feet focal distance, so arranged as to revolve at any velocity up to 60 revolutions per minute. The light from the central lamp being concentrated by refraction through the eight lenses into eight pencils, having a divergence of about 8° each, illuminated not quite 50° of the horizon when at rest; but when this same system of lenses was put into rapid motion, every degree of the 360° of the horizon became illumined, and to spectators placed all round the horizon, the light would appear continuous and equally brilliant in every direction. The only question would be, whether or not this continuous light is essentially less intense than the light seen through the lenses at intervals when in slow motion. The fact is, that two distinct effects are produced in this experiment—a physical effect in diminishing the brilliancy of the light exactly in proportion to the ratio of the dark portion of the horizon, compared to that of the enlightened portion, viz. as 310° to 50°; and a physiological effect, (suggested by Professor Wheatstone,) by which the sensibility of the retina might be so excited by a succession of bright flashes, that not only a continuity of light might be produced, but a light not much, if at all, inferior in intensity to that caused by the lenses at rest. When first set in motion, the effect is that of a series of brilliant but trembling flashes; as the system of lenses is accelerated in velocity, the steadiness of the light increases with scarcely any apparent diminution of brilliancy. At 44 revolutions per minute absolute continuity is produced, and at 60 revolutions nearly the steadiness of a fixed light. When viewed from the distance of

half a mile, the effect is nearly that of continuity, very much resembling that of a fixed star of the first magnitude. The only difference in the quality of the light is, that the lenses being in motion, it resembles a star twinkling violently; and when at rest, it resembles a planet. The difference of intensity had been measured by examining the light through a number of plates of stained glass. Some eyes had seen the light through 13 glasses, the lenses being at rest, and through 12, the lenses being in motion; other eyes, with other glasses, had seen it through 10, the lenses being at rest, and 8, the lenses being in motion. He had seen it through 9, the lenses being in motion, and through 10 at rest. He did not pretend to say whether mechanical difficulties might not prevent the adoption of the system; what he aimed at was to establish the principle, that by putting a system of lights into a rapid rotary motion, a continuous light, visible in all directions, would be the result, without any essential diminution of brilliancy, as compared to that of the same lights when viewed at rest. If this principle should prove correct, its application to practice might afterwards be thought of, and left to the ingenuity of the engineer; but if the principle should not be correct, and there was a great loss of light by the rotary motion, then it would be useless to go on.

Feb. 18.

The President in the Chair.

Mr. Cottam, in reference to the discussion of a preceding evening, (Feb. 4,) on the duty of engines, alluded to the pumping engine, at Hammersmith, which forces the water through five miles of pipes, and then through a vast number of smaller pipes, and was subject to great variations of service; and inquired how the duty could be ascertained with any tolerable accuracy, as the variable expenditure of steam, under different circumstances, must lead to considerable errors. If a boiler, as in the Cornish engines, is adapted to raise the bob 7 times per minute,

and, owing to some cause, as the water not being able to get away, the bob is raised only 5 times per minute,—there is two-sevenths in favour of the boiler; or if an engine, adapted for 30 strokes per minute, makes only 25 occasionally, there is great difficulty in comparing it with other engines.

Mr. Donkin urged the necessity of keeping the quality of the engine, and its commercial effect, perfectly distinct; if a given weight be raised to a given height, it must produce a given effect, minus the friction; in water-works engines, the resistance opposed by the friction is very considerable, and being very variable, it must not be allowed to interfere with the consideration of the intrinsic quality of the engine; of two engines having equal power, one may discharge, owing to these circumstances, more water than the other; but if both be of the same construction, and raise a given weight, whether the water be discharged perpendicularly or forced through any length of horizontal pipes, there can be no mistake as to the amount of the effect produced, or, in other words, of duty performed, as that would be determined by the weight raised if in a Cornish engine, or by the resistance overcome if in an ordinary pumping engine.

Mr. Wicksteed observed, that there was no difficulty in instituting a comparison between the duty of a Cornish engine and of an ordinary water-works engine, because by the former the water was raised through a perpendicular shaft, and by the latter forced through several miles of pipes, of varying length and resistance. He had for several years ascertained, by means of a mercurial syphon guage, the pressure at the pump piston, and this gave with perfect accuracy the resistance overcome by the engine, whether arising from the pressure of water raised to a given or varying height, or from the friction in a great length of pipes. This was easily proved at Old Ford, where the water was raised into a perpendicular column or stand pipe, in which the level of the water would be that necessary for overcoming the resistance opposed by the pressure and friction. In making comparisons between the common water-works engine and the Cornish, this was the mode he had adopted, and he believed

it to be the only fair one. He had proved the accuracy of the mercurial guages by the measurement of the column of water supported. The Cornish engine at Old Ford acts by raising a weight of metal, which upon its return raises the water. This is the only engine in London of the kind, and to establish a comparison between it and and any other pumping engine, it is only requisite to apply a mercurial guage, as just described, to the pump of each, and whether the water is lifted direct or forced through any length of pipes, the resistance or load against which the steam acts, will be shewn. Previously to his Cornish engine being set to work, the beam and plunger were balanced with the greatest accuracy, and their preponderance ascertained before the steam piston and plunger were packed. The weight, afterwards added to the pump end, was also carefully ascertained. The weight raised at each stroke of the engine is thus accurately known. The number of strokes performed, in a given time, is registered by the counter. The coals are carefully weighed. By ordinary attention, the boilers are so managed, with regard to the work to be done, that no steam is allowed to blow away, whether the engine be making 3 or 9 strokes per minute; and in calculating the duty done by the quantity of coal consumed, no deduction is made for stoppages. Thus, a certain number of strokes being made, a known weight has been raised to a given height, a given number of times, by the consumption of a known weight of coals. This engine worked under the pressure of a column of water from 110 to 116 feet in height, and the water was forced through 300 miles of pipe, varying from 42 inches to 3 inches in diameter. The load at the pump in the common pumping engine is ascertained by the same means, and no error can exist in determining the duty performed by each.

Mr. Parkes observed, that the term duty did not seem to be quite understood; duty was not the weight of water raised 1 foot in height, but that weight divided by a bushel or other measure or weight of coals also; that the time in which the water was raised did not enter into the computation of duty, though it did into the determination of horse power. He would

again call attention to the fact, that coal was no measure of power or of the quality of an engine; that one engine might be doing more duty than another, because it had better coal or better boilers; and that the only standard of perfection between different engines was the relative consumption of water as steam for equal effects.

Mr. Parkes observed, that he could entirely confirm the account of the experiments with revolving lenses given by Captain Basil Hall on a preceding evening. It appeared to him, that when the lenses made 32 revolutions, the light was not quite continuous; but at 40 revolutions it was perfectly so, although the general effect was twinkling. The central spot was very distinct; he saw the light equally as distinctly through 10 coloured glasses, the lenses being in motion, and through 11, the lenses being at rest. He would suggest, whether the tremulous appearance of the light might not be in part accounted for by the slightness of the revolving frame, which, at the required velocity vibrates considerably. In the temporary apparatus erected at the Tower, one man could maintain about 40 revolutions per minute.

Mr. Alexander Gordon remarked, the coincidence of the experiments of Captain Basil Hall, with a law of light as laid down by writers on optics,—viz., that if a luminous body pass the eye eight times in one second, the impressions are blended so as to produce the appearance of continuity, or that the duration of an impression on the retina may be taken at about eight seconds. Now, in the apparatus erected by Captain Basil Hall, there are eight lenses, and continuity of light is produced when the frame makes 60 revolutions a minute. Thus, eight lenses flash across the eye in one second, and the observed result is a remarkable confirmation of the law alluded to.

Mr. Hawkins thought the light was better and steadier at 40 revolutions than at any other speed. When observing the reflection of the light on the features of the by-standers, he saw them very distinctly, the lenses being at rest; but from the moment of commencement of motion, there was a visible dimi-

nution in the intensity of the light, which increased with the speed. He saw the light, the lenses being at rest, through 10 coloured glasses, and through 9 when in motion.

Mr. Macneill thought the light was steadier at 60 than at 40 revolutions. The shadow was less intermittent. He did not conceive the mode of examining the intensity of the light through coloured glasses to be so correct as by observing the depth of the shadow, as the eye was capable of judging more correctly of the relative intensity of shadows than of lights. When the lenses were in rapid motion, there appeared a dark spot in the centre of a luminous disc.

Professor Keating, of Philadelphia, stated that the dark spot in the centre appeared as if he saw the wick of the lamp. The lenses being at rest, the light was uniform; but on their acquiring a certain degree of velocity, its whiteness diminished; until at 40 revolutions, a decided orange tint appeared, and at 60 revolutions both the orange hue and the centre dark spot increased.

Mr. Lowe inquired whether the quantity or intensity of light was most required for lighthouses. The conflicting opinions of experimenters on the intensity of light, as ascertained by the photometers now in use, shew that some better test or means of comparison is wanted. He should conceive that pieces of coloured glass could not afford any accurate measurement of the space-penetrating power of light at so small a distance as 345 feet, which he understood was the length of the room in which these experiments were tried. The depth of shadows also furnished no adequate measure of the intensity of light, for shadows were differently coloured for different lights. Perhaps the photogenic paper might furnish the tests and means of comparison now so much wanted.

The President remarked on the advantages of the revolving lights, as apart from the greater brilliancy, in that they are peculiarly useful as being easily distinguished from land and other lights, which tend to mislead mariners. There may be peculiar advantage in the tremulous character of Captain Basil Hall's light, as enabling it to be more easily distinguished among

others. It is not simply the quantity of light which is diffused over the horizon which is valuable, but the intensity of the ray in a certain direction, which, falling on the eye, rivets immediate attention.

Feb. 25.

The President in the Chair.

"On the improvement of navigable Rivers, with a description of a self-acting wasteboard at Naburn Lock, on the River Ouse." By Henry Renton, Grad. Inst. C. E.

Previously to the year 1834, the navigation of the river Ouse, from Selby up to Boroughbridge, a distance of 39 miles, was much impeded by a number of shoals or 'huts,' some of them of considerable extent—all vessels, drawing more than 5 feet water, being compelled to await until the spring tides set in, so as to afford them sufficient depth of water. Mr. Rhodes was consulted as to the best mode of obviating this difficulty. He recommended the employment of a steam dredging-machine to deepen the bed, by removing the shoals, and the construction of a self-acting wasteboard on the dam, so as to give an additional height of water between Naburn and Linton Locks, as it was found that no injury could occur in the adjacent lands from the level of the river being raised 18 inches.

The greater part of the shoals consisted of compact blue clay, with a mixture of gravel and large boulder stones, and in a few instances, of oak trees, such as are found near the bottom of bogs.

To use the dredging-machine in the most advantageous manner, the principle of the sliding tool, in a turning lathe, was adopted, by running the machine across the face of the shoal from side to side of the river, without altering the position of the lower tumbler. This method produced a perfectly even horizontal surface of the bed, and prevented subsequent accumulation. The whole of the shoals were thus removed, so that sea-borne vessels and steamers, drawing from 11 to 12 feet water, could at all periods navigate to York, a distance of 80 miles from the

Humber. It was still necessary to raise the height of the water at least 18 inches between Naburn and Linton Locks, to enable vessels drawing 7 feet water to pass at all seasons from York up to Boroughbridge, a farther distance of 20 miles. To accomplish this, the self-acting wasteboard was constructed.

It is composed of two distinct boards of Memel timber, each 76 feet long, 18 inches high, and 4 inches thick, placed on the top of the angular face of the dam. It is fixed by means of strong wrought-iron hinges, leaded into the stone-work, at intervals of 10 feet. Over the hinges are fixed wrought-iron bolts, 1 inch diameter, connected by flat chains with the plimmer blocks on a line of shafts, extending behind each board on the face of the dam; on the ends of these shafts are fixed spur-wheels, working into pinions which drive pulleys, over which run the chains supporting the balance weights, which are hung on the face of the wing walls. When the balance weights are at the bottom of the walls, the wasteboard will be in an upright position, which occurs when the surface of the water does not rise 6 inches above the top of the boards, or 2 feet above the dam; but when, on a sudden increase of the volume of water, there is a considerable pressure on the face of the wasteboard, it more than counterbalances the weights, and causes the boards to incline towards a horizontal position, at the same time raising the balance weights and allowing a free passage for the water. When the pressure diminishes, the weights descend, and the boards resume their vertical position.

The time occupied in dredging the river and constructing the wasteboards, was two years, and the cost of the latter, which was made by Messrs. J. and W. Lailder, of York, was £300.

The result of these alterations has been most satisfactory, as since their completion not a vessel has been detained in the upper level, and the registers of the heights of the water at Linton and Naburn Locks and York shew, that the winter floods have not risen to such a height, or continued for so long a period, as previously to the improvements being carried into effect.

List of Patents

Granted for Scotland between the 22d June, and 22d July, 1840.

To William Neale Clay, of Flimby, for certain improvements in the manufacture of iron.—Sealed 25th June.

Rice Harris, of Birmingham, for certain improvements in cylinders, plates, and blocks, used in printing and embossing.—Sealed 25th June.

Robert Cook, of Johnston, Renfrewshire, engineer, for the making of bricks by machinery, to be wrought either by steam or other power.—Sealed 30th June.

John Hemming, of North Bank, Regent's Park, London, for improvements in gas metres.—Sealed 30th June.

Thomas Richardson, of Newcastle, chemist, for a preparation of sulphate of lead, applicable to some of the purposes to which carbonate of lead is now applied.—Sealed 30th June.

David Morison, of Wilson-street, Finsbury, London, ink-maker, for improvements in printing.—Sealed 30th June.

Jonathan Sparke, of Langley Mills, Northumberland, agent, for certain improved processes or operations for smelting lead ores.—Sealed 2nd July.

William Mc Murray, of Kenteith Mills, near Edinburgh, paper-maker, for certain improvements in the manufacture of paper. —Sealed 2nd July.

Robert Stirling Newall, of Dundee, (partly communicated by a foreigner,) for certain improvements in wire ropes, and in machinery for making such ropes, which ropes are applicable to various purposes.—Sealed 2nd July.

Charles Greenway, of Douglas, in the Isle of Man, for certain improvements in reducing friction in wheels of carriages, which improvements are also applicable to bearings and journals of machinery.—Sealed 2nd July.

John Lothian, of Edinburgh, geographer, for improvements in apparatus for measuring or ascertaining weights, strains, or pressure.—Sealed 7th July.

John Swain Worth, of Manchester, (communicated by a foreigner) for certain improvements in rotatory engines, to be worked by steam and other fluids, such engines being also applicable for pumping water and other liquids.—Sealed 7th July.

Thomas Peet, of Bread-street, London, (communicated from abroad,) for improvements in steam-engines.—Sealed 10th July.

Thomas Bainbridge, of Park-place, St. James's, London, for improvements in obtaining power.—Sealed 10th July.

Thomas Juckes, of Shropshire, for improvements in furnaces or fire-places, for the better consuming of fuel.—Sealed 10th July.

James Harvey, of Bazing-place, Waterloo-road, London, timber-merchant, for certain improvements in paving streets, roads, and ways, with blocks of wood, and in the machinery or apparatus for cutting or forming such blocks.—Sealed 13th July.

William Henry Bailey Webster, of Ipswich, surgeon, for improvements in preparing skins and other animal matters for the purposes of tanning, and the manufacture of gelatine.—Sealed 13th July.

Alexander Bow, of Crown-street, Hutchesontown, Glasgow, builder, for improvements in furnaces and flues, by the introduction and application of hot air thereto, and for the consumption of smoke, and economising fuel.—Sealed 14th July.

New Patents
SEALED IN ENGLAND.
1840.

To John William Nyren, of Bromley, manufacturing chemist, for improvements in the manufacture of oxalic acid.—Sealed 26th June—6 months for inrolment.

Thomas Spencer, of Manchester, machine-maker, for a certain improvement or improvements in twisting ma-

chinery, used for roving, spinning, and doubling cotton, wool, silk, flax, and other fibrous materials.—Sealed 26th June—6 months for inrolment.

William Jefferies, of Holme Street, Mile End, metal refiner, for improvements in obtaining copper, spelter, and other metals from ores.—Sealed 1st July—6 months for inrolment.

William Mc Murray, of Kenteith Mill, Edinburgh, paper maker, for certain improvements in the manufacture of paper.—Sealed 1st July—6 months for inrolment.

John David Poole, of Holborn, practical chemist, for improvements in evaporating and distilling water, and other fluids,—being a communication.—Sealed 2nd July—6 months for inrolment.

Charles May, of Ipswich, engineer, for improvements in machinery for cutting and preparing straw, hay, and other vegetable matters.—Sealed 6th July—6 months for inrolment.

Edwin Turner, of Leeds, engineer, for certain improvements applicable to locomotive and other steam-engines.—Sealed 6th July—6 months for inrolment.

James Harvey, of Bazing-place, Waterloo-rd., gentleman, for improvements in extracting sulphur from pyrites, and other substances containing the same.—Sealed 8th July—6 months for inrolment.

Louis Leconte, of Leicester-square, gentleman, for improvements in constructing fire-proof buildings.—Sealed 9th July—6 months for inrolment.

Joshua Taylor Beale, of East Greenwich, engineer, for certain improvements in steam-engines.—Sealed 10th July—6 months for inrolment.

George Barnett, of Jewin-street, London, tailor, for improvements in fastenings for wearing apparel.—Sealed 11th July—6 months for inrolment.

Joseph Getten, of Paul's Chain, London, merchant, for

improvements in preparing and purifying whale oil,—being a communication.—Sealed 11th July—6 months for inrolment.

William Palmer, of Feltwell, Norfolk, blacksmith, for certain improvements in ploughs.—Sealed 11th July—6 months for inrolment.

Peter Fairbairn, of Leeds, engineer, for certain improvements in machinery or apparatus for heckling, combing, preparing or dressing hemp, flax, and such other textile or fibrous materials,—being a communication.—Sealed 13th July—6 months for inrolment.

Thomas Tassell Grant, Esquire, an Officer in Her Majesty's Victualling Yard, at Gosport, for improvements in the manufacture of fuel.—Sealed 13th July—6 months for inrolment.

Edwin Travis, of Shaw Mills, near Oldham, Lancaster, cotton spinner, for certain improvements in machinery or apparatus for preparing cotton and other fibrous materials for spinning.—Sealed 15th July—6 months for inrolment.

John Lambert, of Coventry-street, St. James's, within the Liberty of Westminster, gentleman, for certain improvements in the manufacture of soap,—being a communication.—Sealed 15th July—6 months for inrolment.

James Jamieson Cordes and Edward Locke, of Newport, in the county of Monmouth, for a new rotary engine.—Sealed 18th July—6 months for inrolment.

Moses Poole, of Lincoln's-inn, gentleman, for improvements in fire-arms, and in apparatus to be used therewith,—being a communication.—Sealed 18th July—6 months for inrolment.

James Roberts, of Brewer-street, Somers Town, ironmonger, for improved machinery or apparatus to be applied to the windows of houses or other buildings, for the purpose of preventing accidents to persons employed in cleaning or repairing the same, and also for facilitating the escape of

persons from houses, when on fire.—Sealed 18th July—6 months for inrolment.

Francis Todd, of Pindinnis Castle, Falmouth, gentleman, for improvements in obtaining silver from ores and other matters containing it,—being a communication.—Sealed 27th July—6 months for inrolment.

Robert Urwin, of Durham, engineer, for improvements in steam engines.—Sealed 29th July—6 months for inrolment.

John Swain Worth, of Manchester, merchant, for improvements in machinery for cutting vegetable substances,—being a communication.—Sealed 29th July—6 months for inrolment.

Alexander Angus Croll, Superintendent of the Chartered Gas Company's Works, Brick-lane, for certain improvements in the manufacture of gas, for the purpose of illumination; and for the preparation or manufacture of materials to be used in the purification of gas, for the purpose of illumination.—Sealed 29th July—6 months for inrolment.

A grant unto John George Bodmer, of Manchester, civil engineer, of an extension for the term of seven years of letters patent, granted to him for certain improvements in the machinery for cleaning, carding, drawing, roving, and spinning of cotton and wool.—Sealed 29th July.

Joseph Bennett, of Turnlee, near Glossop, Derby, cotton spinner, and paper-maker, for certain improvements in machines for cutting rags, ropes, waste hay, straw, or other soft or fibrous substances, usually subject to the operation of cutting or chopping; part of which improvements are applicable to the tearing, pulling in pieces, or opening of rags, ropes, or other tough materials.—Sealed 29th July—6 months for inrolment.

CELESTIAL PHENOMENA, for August, 1840.

D.	H.	M.	
1			Clock before the sun, 5m. 59s.
	—		☽ rises 8h. 57m. M.
	—		☽ passes mer. 3h. 6m. A.
	—		☽ sets 8h. 59m. A.
	19	35	♃ in □ with the ☉
4	16	10	♃ in conj. with the ☽ diff. of dec. 6. 23. N.
5			Clock before the sun, 5m. 40s.
	—		☽ rises 2h. 1m. M.
	—		☽ passes mer. 6h. 4m. A.
	—		☽ sets 9h. 58m. A.
	5	14	☽ in □ or first quarter.
7	11	55	♄ in conj. with the ☽ diff. of dec. 6. 26. N.
10			Clock before the sun, 5m. 2s.
	—		☽ rises 6h. 37m. M.
	—		☽ passes mer. 10h. 16m. A.
	—		☽ sets 0. 50. A.
11			Occul *f* in Capri. im 6h. 30m. em. 7h. 34m.
	—		Vesta in conj. with ☉ in Libra diff. of dec. 0 47. N.
12			☽ eclipsed, invis. at Greenwich
13	0	14	☿ greatest hel. lat. S.
	7	15	Ecliptic oppo. or ○ full moon
14	14	34	☿ in inf. conj. with the sun
15			Clock before the sun, 4m. 10s.
	—		☽ rises 8h. 0m. A.
	—		☽ passes mer. 1h. 21m. M.
	—		☽ sets 7h. 10m. A.
	3	15	Her: in conj. with the ☽ diff. of dec. 3. 9. S.
	—		Occul 21 Piscium im. 12h. 50m. em. 13h. 0m.
16			Mercury R. A. 9h. 28m. dec. 10. 20. N.
	—		Venus R.A. 10h. 9m. dec. 12. 53. N.
	—		Mars R.A. 7h. 50m. dec. 22. 0. N
	—		Vesta R. A. 15h. 50m. dec. 17. 40. S.
	—		Juno R. A. 9h. 2m. dec. 10. 41. N
	—		Ceres R. A. 19h. 28m. dec. 31. 43. S.
	—		Pallas R. A. 18h. 17m. dec. 16 25. N.

D.	H.	M.	
	—		Jupiter R. A. 14h. 36m. dec. 14. 22. S.
	—		Saturn R. A. 16h. 56m. dec. 21. 16. S.
	—		Georg. R. A. 23h. 22m. dec. 4. 57. S.
	—		Mercury passes mer. 23h. 41m.
	—		Venus passes mer. 0h. 29m.
	—		Mars passes mer. 22h. 9m.
	—		Jupiter passes mer. 4h. 56m.
	—		Saturn passes mer. 7h. 51m.
	—		Georg. passes mer. 13h. 40m.
19	4		♄ stationary
20			Clock before the sun, 3m. 19s.
	—		☽ rises, 9h. 35m. A.
	—		☽ passes mer. 5h. 24m. M.
	—		☽ sets 2h. 4m. A.
	0	17	☽ in □ or last quarter
	2	56	♀ greatest hel. lat. N.
22	18	14	☿ in conj. with Juno.
23	8	10	♃'s second satt. will im.
23	17	24	☿ stationary
24	9	40	♂ in conj. with the ☽ diff. of dec. 1. 26. S.
	—		Occul 39 Cancri im. 15h. 31m. em. 16h. 25m.
	—		Occul 40 Cancri im. 15h. 34m. em. 15h. 28m.
	16	25	Vesta in □ with the ☉
25			Clock before the sun, 1m. 49s.
	—		☽ rises 2h. 15m. M.
	—		☽ passes mer. 10h. 29m. M.
	—		☽ sets 6h. 21m. A.
	12	23	☿ in conj. with the ☽ diff of dec. 3. 0. S.
26			☉ eclipsed, invis. at Greenwich
27			Pallas stationary
	6	44	Ecliptic conj. or ● new moon
	14	41	♀ in conj. with the ☽ diff. of dec. 3. 18. N
30			Clock before the sun, 0m. 23s.
	—		☽ rises 9h. 9m. M.
	—		☽ passes mer. 2h. 26m. A.
	—		☽ sets 7h. 30m. A.
31	15	16	☿ in conj. with Juno
	17	7	☿ greatest elong. 18. 5 W.
	23	35	☿ in the ascending node.

J. LEWTHWAITE, Rotherhithe.

INDEX TO VOL. XVI.

[CONJOINED SERIES.]

Page

Adjudication, Scientific, Crane v Price 163
Alum, improvements in the manufacture of, Wiesman's patent 365
Anchors, improvements in the construction of, Christopher's patent 287
Beer, improvements in brewing, Grover's patent 93
—— engines, improvements in the construction of, Warne's patent 157
Boiler plates, improvements in machinery for rivetting, Smith's patent 278
Boxes for wheels, improvements in, Poole's patent 27
Building walls and houses, improvements in, Rogers' patent 135
Carriages, improvements in wheels for, Day's patent 25
——, improvements in propelling, Vickers' patent 26
Cast steel, improvements in the manufacture of, Vickers' patent 159
Celestial phenomena, 120, 184, 256, 320, 384
Chains, improvements in making, Wright's patent 121
Chronometers and watches, improvements in, Philcox's patent 325
Civil engineers, report of the transactions of the society of, 45, 103, 169, 237, 303, 367
Cocks and taps, improvements in the construction of, Arter's patent 214
Combing and drawing wool and goat's hair, improvements in, Donisthorpe and Rawson's patent 149
——, Ross' patent 151
—— 152
——, Smith and Smith's patent 219
Consuming smoke, improvements in apparatus for, Chapé's patent 203
——, Drew's patent 321

Page

Copyright of designs, on the act to protect the, ... 95
Corkscrews, improvements in the construction of, Osborne's patent 210
Cotton, improvements in spinning, Robertson's patent.... 71
——, improvements in preparing, Cheetham's patent.... 76
Cutting wood, an improved instrument for, Stevenson and Ruthven's patent.......... 283
——, improvement in apparatus for, Skinner's patent 284
——, improvements in apparatus for, Aulas' patent 285
Daguerreotype, for a new invention called, Berry's patent .. 1
Dyes and inks, improvements in the manufacture of, De Normandy's patent 138
Dyeing, improvements in apparatus for, Robinson's patent 63
Earth, improvements in excavating, cutting, and removing, Newton's patent 57
Elastic fabrics, improvements in making, Poole's patent .. 359
Electrotype, or method of producing fac similies of copper plates, by voltaic electricity 101
Explosions in steam boilers, improvements in preventing, Devaux's patent 185
Flax, improvements in apparatus for crushing, Watson's patent 218
——, improvements in heckling and dressing, Wordsworth's patent 264
Forgery, improvements in preparing paper for the prevention of, Aulas' patent 297
Forks and spoons, improvements in machinery for making, Skrine's patent 141
Fuel, improvements in preparing turpentine for, Williams' patent 82

Page

Gas, improvements in the manufacture of, Cobbold's patent 288
——, Count Val Marino's improved method of making .. 236
Gelatine, improvements in the manufacture of, Nelson's patent 90
Gig mills, improvements in the construction of, Haden's patent 215
——————, Webb's patent 330
Heckling and dressing flax, improvements in, Wordsworth's patent 264
Hinges, improvements in the manufacture of, Edwards' patent 226
————, Henfrey's patent 224
————, Johnson's patent 227
————, Vale's patent.... 223
Hosiery, improvements in apparatus for finishing, Bates' patent 338
Hot oil lamp, description of an improved, ... 234
Human figure, an improved method of measuring the, Leslie's patent 329
Inks and dyes, improvements in the manufacture of, De Normandy's patent 138
Iron, improvements in the manufacture of, Clay's patent .. 291
Isinglass, improvements in the manufacture of, Nelson's patent 216
Lamps, improvements in the construction of, Lamb's patent 142
———, description of hot oil, 234
Lead, improvements in apparatus for rolling, Burr's patent 228
—— pipes and tubes, improvements in making, Hanson's patent 344
Letters, improvements in applying stamps and labels to, Bogardus' patent 158
Locks, improvements in the construction of, Lord Audley's patent 225
Metals, improvements in preventing the oxydation of, Fontainemoreau's patent 299
Ornamenting walls, improvements in, Troughton's patent 228
Oxydation of metals, improvements in preventing the, Fontainemoreau's patent 229

Page

Paddle wheels, improvements in the construction of, Todd's patent 145
Paper, improvements in apparatus for ruling, Banks' patent 89
———, improvements in the manufacture of, Crompton's patent 92
———, Dickenson's patent 282
——————, Joynson's patent 93
————, Mc Gauran's patent 30
———, an improved method of making, so as to prevent forgery, Aulas' patent 297
Patents, list of, sealed in England, 113, 180, 251, 315, 380
——————, Scotland 56, 178, 249, 314, 379
——————, France 49, 307

Report of Recent Patents.

Arter, C., for improvements in the construction of cocks and taps 214
Audley, Lord, for improvements in the construction of locks 225
Aulas, C, F. E., for improvements in cutting wood...... 285
——————, for an improved method of preparing paper for the prevention of forgery 297
Banks, W., for improvements in ruling paper............ 89
Bates, W., for an improved method of finishing hosiery 338
Berry. M., for a new invention called Daguerreotype 1
————, for improvements in the construction of weighing machines 128
Bogardus, J., for an improved mode of applying stamps and labels to letters............ 158
Brindley, W., for improvements in the construction of presses 286
Browne, J., for improvements in paving streets, roads, & ways 271
Burr, T., for improvements in rolling lead 228
Carey, R., for improvements in wood paving.............. 271
Chappé, P., for an improved apparatus for consuming smoke 203
Cheetham, D., for improvements in preparing cotton .. 76

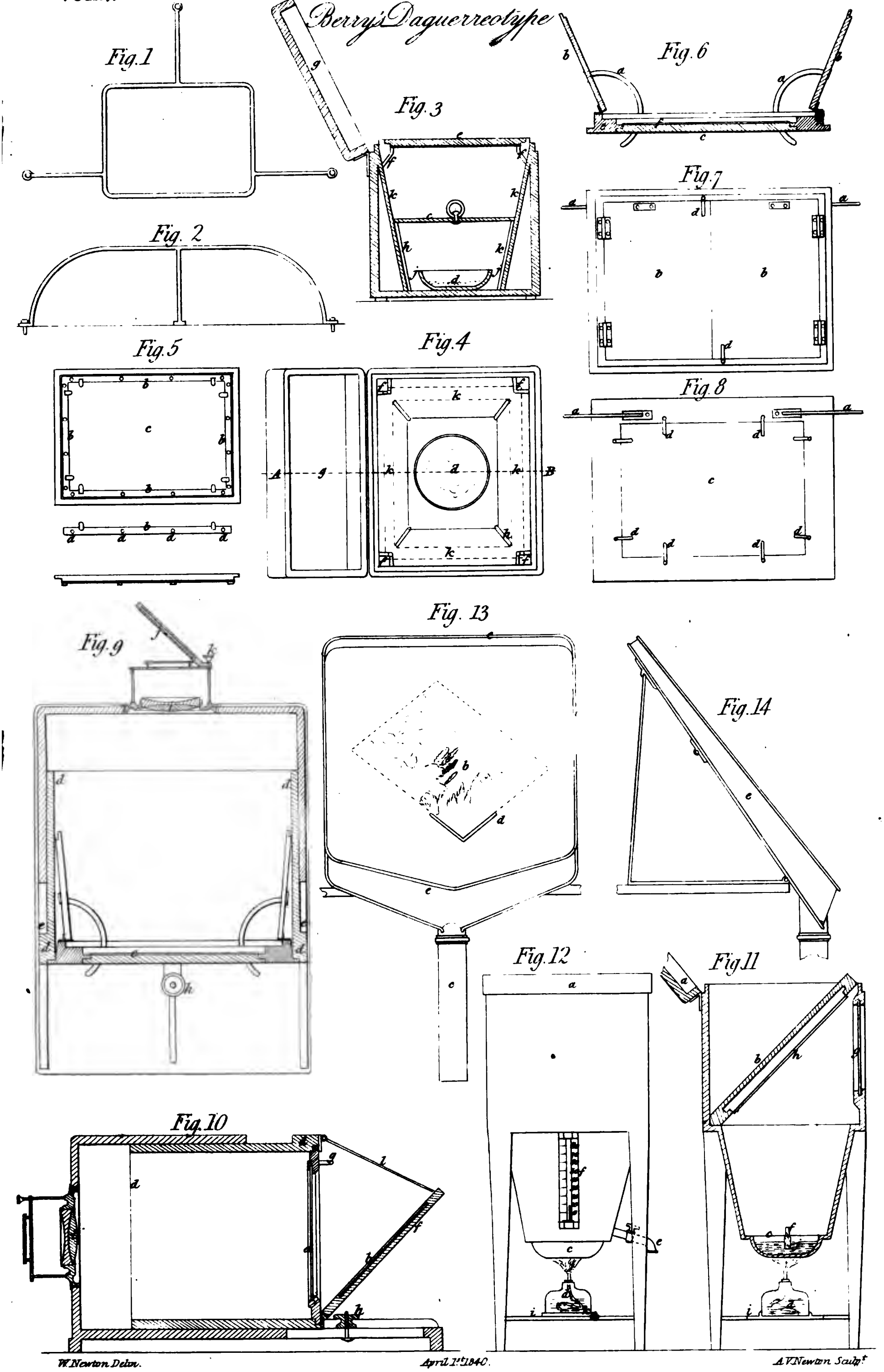
Page
Christophers, J., for improvements in the construction of anchors 287
Clay, W. N., for improvements in the manufacture of iron .. 291
Cobbold, E., for improvements in the manufacture of gas .. 288
Colchester, W., for an improved soap frame 144
Crompton, T. B., for improvements in making paper 92
Day, J., for improvements in the construction of wheels for carriages 25
De Normandy, A. R. le Mire, for improvements in inks and dyes 138
Devaux, C. P., for an improved apparatus for preventing the explosion of steam boilers .. 185
Dickenson, J., for improvements in the manufacture of paper 282
Doe. J. B., for an improved soap frame 206
Donisthorpe, G. E,, and Rawson, H , for improvements in apparatus for combing wool and goat's hair............ 149
Drew, J., for an improved apparatus for consuming smoke 321
Edwards, T., for improvements in hinges 226
England, G., for an improved screw jack 39
Fell, J., for improvements in ship building 148
Fontainemoreau, P. A., for improvements in preventing the oxydation of metals........ 299
Geary, S., for improvements in wood paving.............. 274
Gibbs, J., for improvements in spinning 328
Griffiths, H., for an improved method of printing in colours 42
Grover, H. M., for improvements in brewing beer...... 93
Haden, G., for improvements in gig mills for dressing cloth 215
———, for improvements in the manufacture of soap 233
Hanson, J. & C., for improvements in making pipes and tubes 344
Heaton, R. H., and Whittaker, J. W., for improvements in machinery for piecing straps 84
Henfrey, J., for improvements in hinges 224
Heyworth, L., for improvements in rotary steam-engines 37
Hodgson, R., for improvements in building and paving 276
Howard, J. S., for improvements in roving frames 72
Hullmandel, C., for improvements in calico printing 259
Johnson, D., for improvements in hinges 227
Joynson, W., for improvements in the manufacture of paper 93
Lamb, R., for improvements in the construction of lamps .. 142
Lees, J., for improvements in spinning cotton 73
Leslie, J., for an improved method of measuring the human figure 329
Mc Gauran, T., for improvements in making paper 30
Movillon, A., for improvements in propelling vessels 33
Nelson, G., for improvements in the manufacture of gelatine 90
———, for improvements in the manufacture of isinglass 216
Newton, W., for improvements in excavating, cutting, and removing earth 57
———, for improvements in the construction of sundials 352
Normandy, A. R. le Mire de, for improvements in the manufacture of inks and dyes .. 138
North, T., for improvements in the manufacture of wire 222
Osborne, C., for improvements in the construction of corkscrews 210
Philcox, G., for improvements in chronometers and watches 325
Poole, M., for improvements in boxes for wheels 27
———, for improvements in obtaining rotary motion 31
———, for improvements in making soap 143
———, for improvements in the manufacture of elastic fabrics 359
———, for improvements in tanning 94
Ramee, D., for improvements in paving streets, roads, and ways 269

Page
Rawson, H., and Donisthorpe, G. E., for improvements in combing wool and goat's hair 149
Read, J., for improvements in raising and forcing fluids .. 69
Robertson, J., for improvements in spinning cotton 71
Robinson, J., for improvements in apparatus for dyeing 63
Rogers, S., for improvements in building walls and houses .. 135
Ross, H., for improvements in combing wool and goat's hair 151
——— 152
Ruthven, J., and Stevenson, J., for improvements in machinery for cutting wood 283
Shuttleworth, J. G., for improvements in obtaining rotary motion 28
Skinner, J., for improvements in cutting wood for veneers . 284
Skrine, J., for improvements in making spoons and forks .. 141
Smith, R., for improvements in rivetting boiler plates 278
———, S. & W., for improvements in combing wool and hair 219
Stead, D., for improvements in wood paving 273
Stevenson, J., and Ruthven, J., for improvements in machinery for cutting wood .. 283
Todd, T., for improvements in propelling vessels 145
Troughton, N., for improvements in ornamenting walls 228
Uzielli, M., for improvements in preserving wood from decay 156
Vale, T., for improvements in hinges 223
Vandeleur, H. S. M., for improvements in paving streets 267
Vickers, W., for improvements in the manufacture of cast steel 159
———, for improvements in propelling carriages 26
Warne, J., for improvements in beer engines.............. 157
Watson, B. F., for improvements in machinery for crushing flax 218
Webb, J., for improvements in machinery for raising the pile on woollen cloth 330
Whittaker, J. W., and Heaton, R. W., for improvements in machinery for piecing and joining straps 84
Wiesman, W., for improvements in the manufacture of alum.. 365
Williams, C. W., for an improved method of preparing turpentine, to be used as fuel 82
Woolrich, J., for improvements in the manufacture of white lead 230
Wordsworth, J., for improvements in heckling and combing flax 264
Wright, J., for improvements in making chains of wire.... 121

Patterns and designs for printing, a new method of producing, Hullmandel's patent 259
Pavement of sawn slate, notice of, 162
Paving streets, improvements in, Browne's patent 271
———, Carey's patent 271
———, Geary's patent 274
———, Hodgson's patent.. 276
———, Ramee's patent .. 269
———, Stead's patent 273
———, Vandeleur's patent 267
Piecing straps, improved machinery for, Whittaker and Heaton's patent 84
Pipes and tubes, improvements in the manufacture of, Hanson's patent 344
Preserving wood, improvements in, Uzielli's patent 156
Presses, improvements in the construction of, Brindley's patent 286
Printing in colours, an improved method of, Griffiths' patent 42
Propelling carriages, improvements in, Vickers' patent .. 26
——— vessels, improvements in apparatus for, Movillon's patent 33
———, Todd's patent 145
Raising and forcing fluids, improvements in apparatus for, Read's patent 69
Raising the pile on woollen cloth, improvements in machinery for, Haden's patent........ 215
———, Webb's patent 330
Rivetting boiler plates, improvements in machinery for, Smith's patent 278

Page
Rolling lead, improvements in machinery for, Burr's patent 228
Rotary motion, improvements in obtaining, Poole's patent 31
———, Shuttleworth's patent 28
Rotary steam-engine, for an improved, Heyworth's patent.. 37
Roving frames, improvements in the construction of, Howard's patent 72
Screw jack, for an improved, England's patent 39
Ships, improvements in building, Fell's patent.............. 148
Slate pavement.............. 162
Smoke, improvements in apparatus for consuming, Chappé's patent 203
————————, Drew's patent 321
Soap, improvements in the manufacture of, Haden's patent 233
——————, Poole's patent 143
Soap frame, for an improved, Colchester's patent 144
——————, Doe's patent 206
Spinning cotton, improvements in machinery for, Gibbs' patent 328
——————, Lees' Patent 73
————, Robertson's patent 71
————, improvements in preparing cotton for, Cheetham's patent 76
——————, Howard's patent 72
Steam boilers, improvements in apparatus for preventing the explosion of, Devaux's patent 185
—— engines, improvements in the construction of, Heyworth's patent 37
Steel, improvements in the manufacture of cast, Vickers' patent 159
Straps, improvements in machinery for piecing, Whittaker and Heaton's patent.... 84
Sun-dials, improvements in the construction of, Newton's patent 344
Tanning, improvements in, Poole's patent 94
Thames tunnel, annual report on the 98
Turpentine for fuel, improvements in preparing, Williams' patent 82
Veneers, improvements in cutting, Skinner's patent 284
Voltaic battery, an improved .. 160
Walls, improvements in building, Rogers's patent 135
———, improvements in ornamenting, Troughton's patent 228
Watches and chronometers, improvements in, Philcox's patent 325
Weighing machines, improvements in the construction of, Berry's patent 128
Wheels for carriages, improvements in the construction of, Day's patent 25
———, improvements in boxes for, Poole's patent 27
White lead, improvements in the manufacture of, Woolrich's patent 230
Wire, improvements in machinery for making, North's patent 222
—— chains, improvements in machinery for making, Wright's patent 121
Wood, improvements in machinery for cutting, Aulas' patent 285
————. Skinner's patent 284
——, improved instruments for cutting, Stevenson and Ruthven's patent 283
—— paving, improvements in, Carey's patent 271
————, Geary's patent 274
————, Hodgson's patent .. 276
————, Stead's patent...... 273
————, Vandeleur's patent 267
——, improvements in preserving and impregnating, Uzielli's patent 156
Wool and goat's hair, improvements in machinery for combing and dressing, Donisthorpe and Rawson's patent 149
——————, Ross' patent 151
———————————— 152
——, Smith and Smith's patent 219
Woollen cloth, improvements in dressing and finishing, Haden's patent 215
——————, Webb's patent 330

Berry's Daguerreotype



W. Newton Delin. April 1st 1840. A.V. Newton Sculpt.

Shuttleworth's Impt. in Obtaining Rotary Motion

Fig. 3

Fig. 2

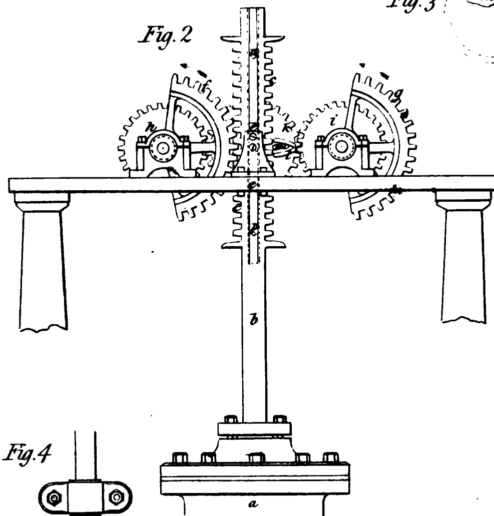


Fig. 1

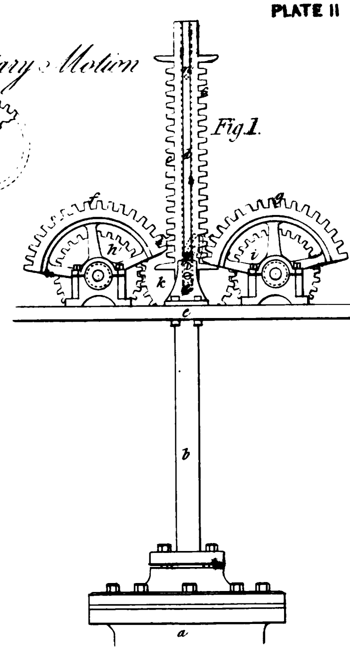
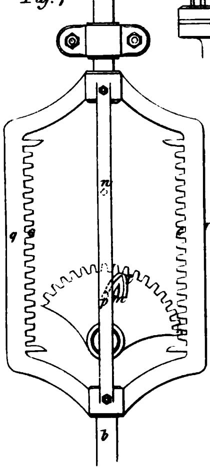


Fig. 4



Day's Improved Wheel

Fig. 8

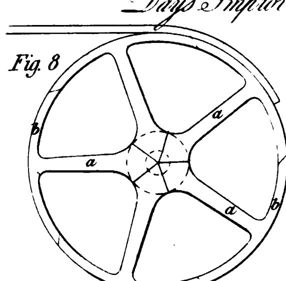


Fig. 5

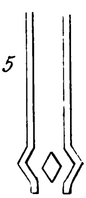


Fig. 6

Fig. 7

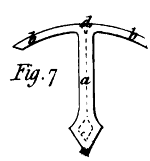
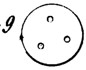
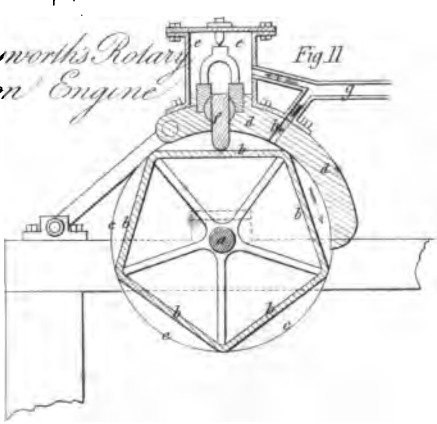


Fig. 9



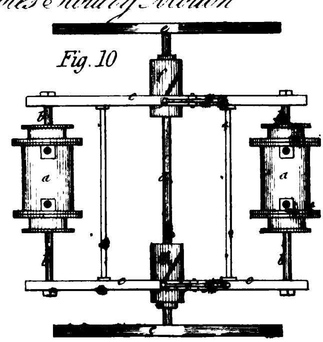
Heyworth's Rotary Steam Engine

Fig. 11



Poole's Rotary Motion

Fig. 10



Movillon's Improvements in Propelling

Fig. 2

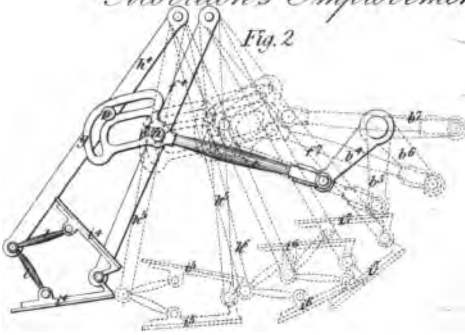


Fig. 1

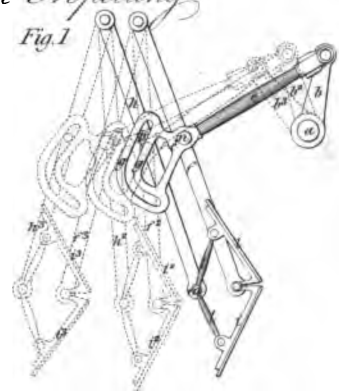


Fig. 6

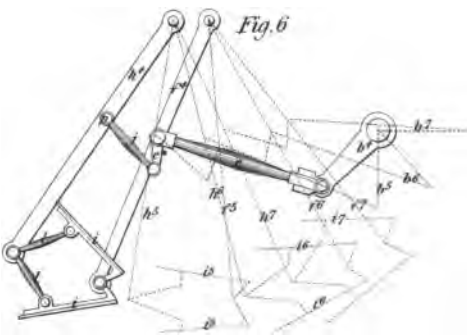


Fig. 5

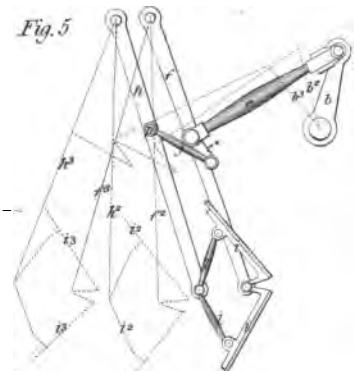


Fig. 4

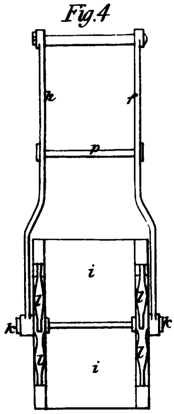
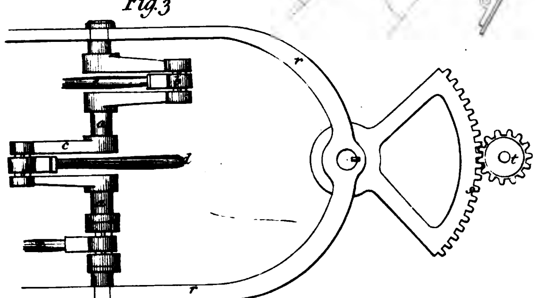


Fig. 3



England's Screw Jack

Fig. 1

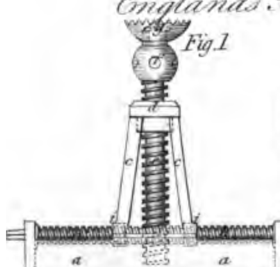


Fig. 4

Fig. 2

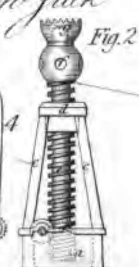
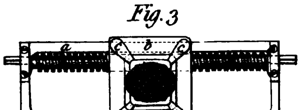
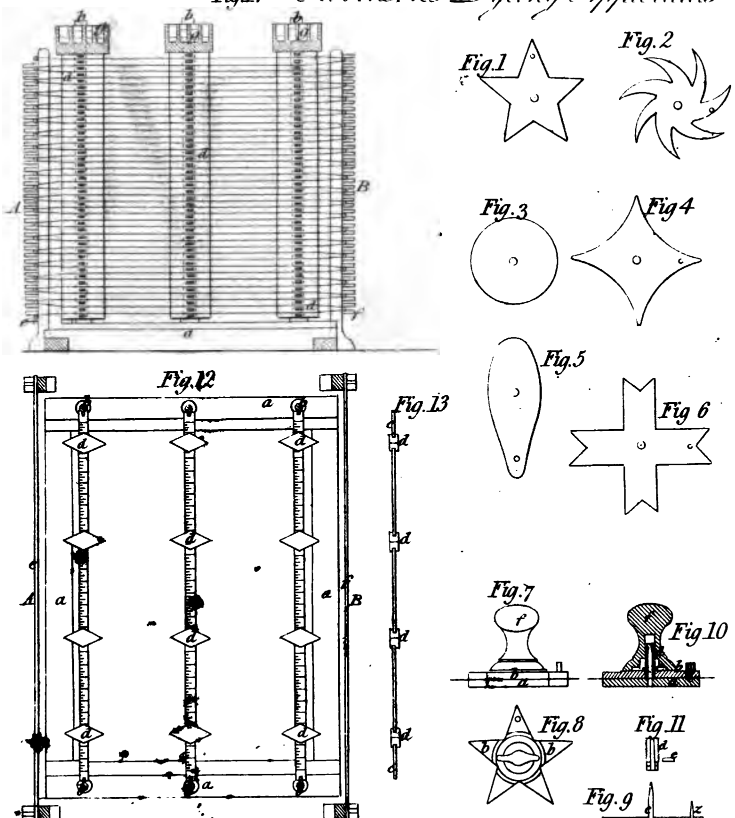


Fig. 3

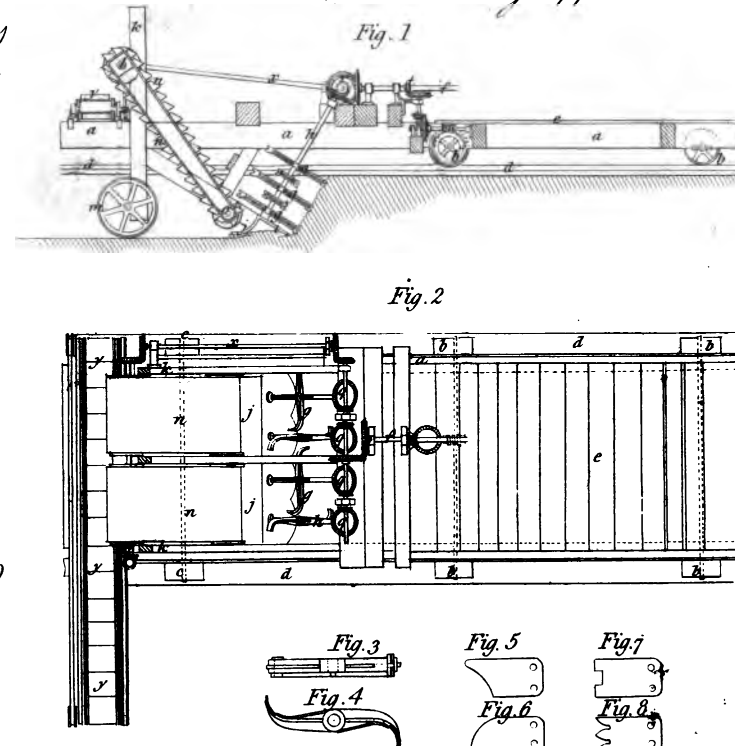


W. Newton Delt. 1st April 1840. C. J. Malby Sculpt.

Robinson's Dyeing Apparatus



Newton's Excavating Apparatus

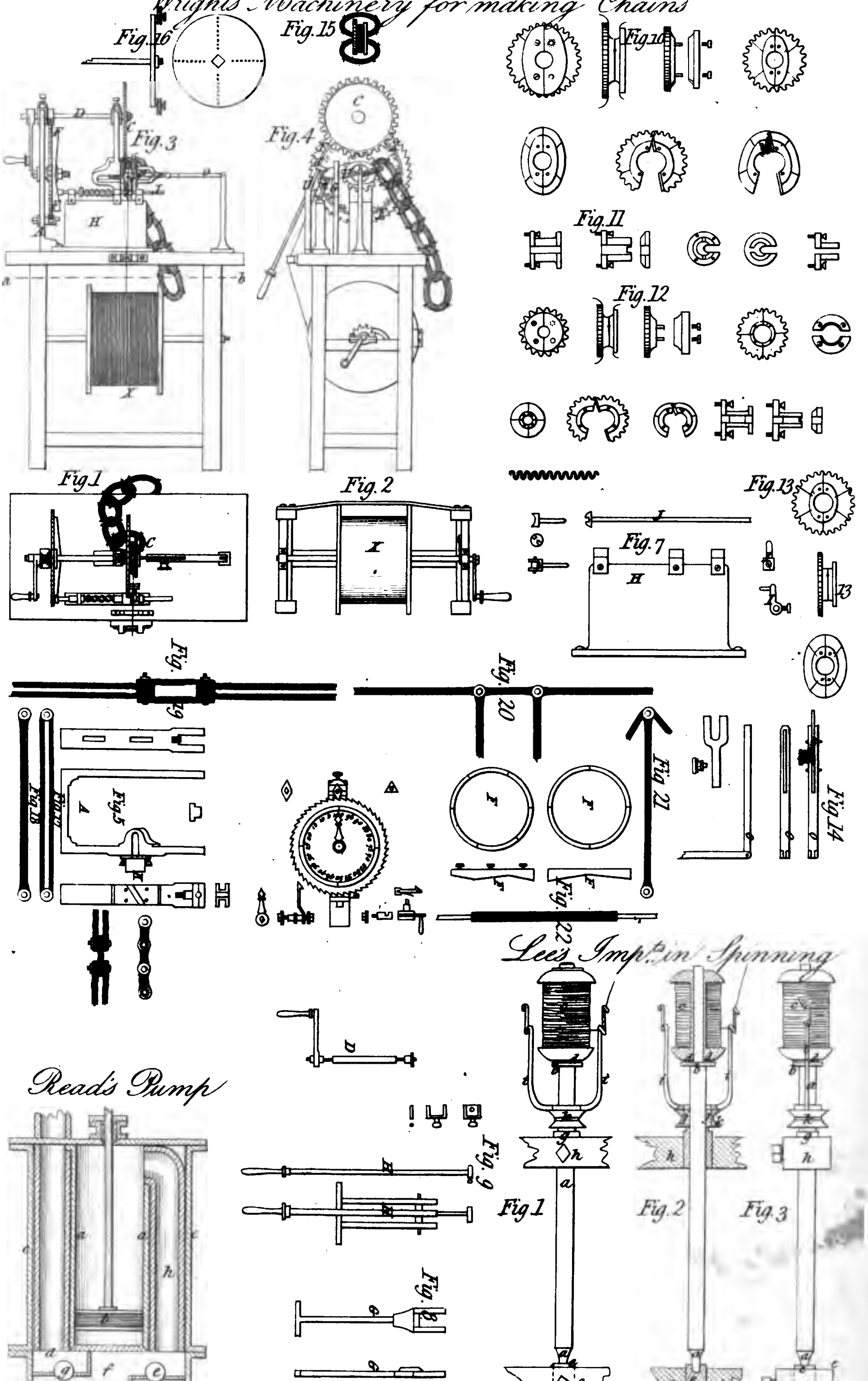


W. Newton Delt. 1st April 1840. J. Basire Sculpt.

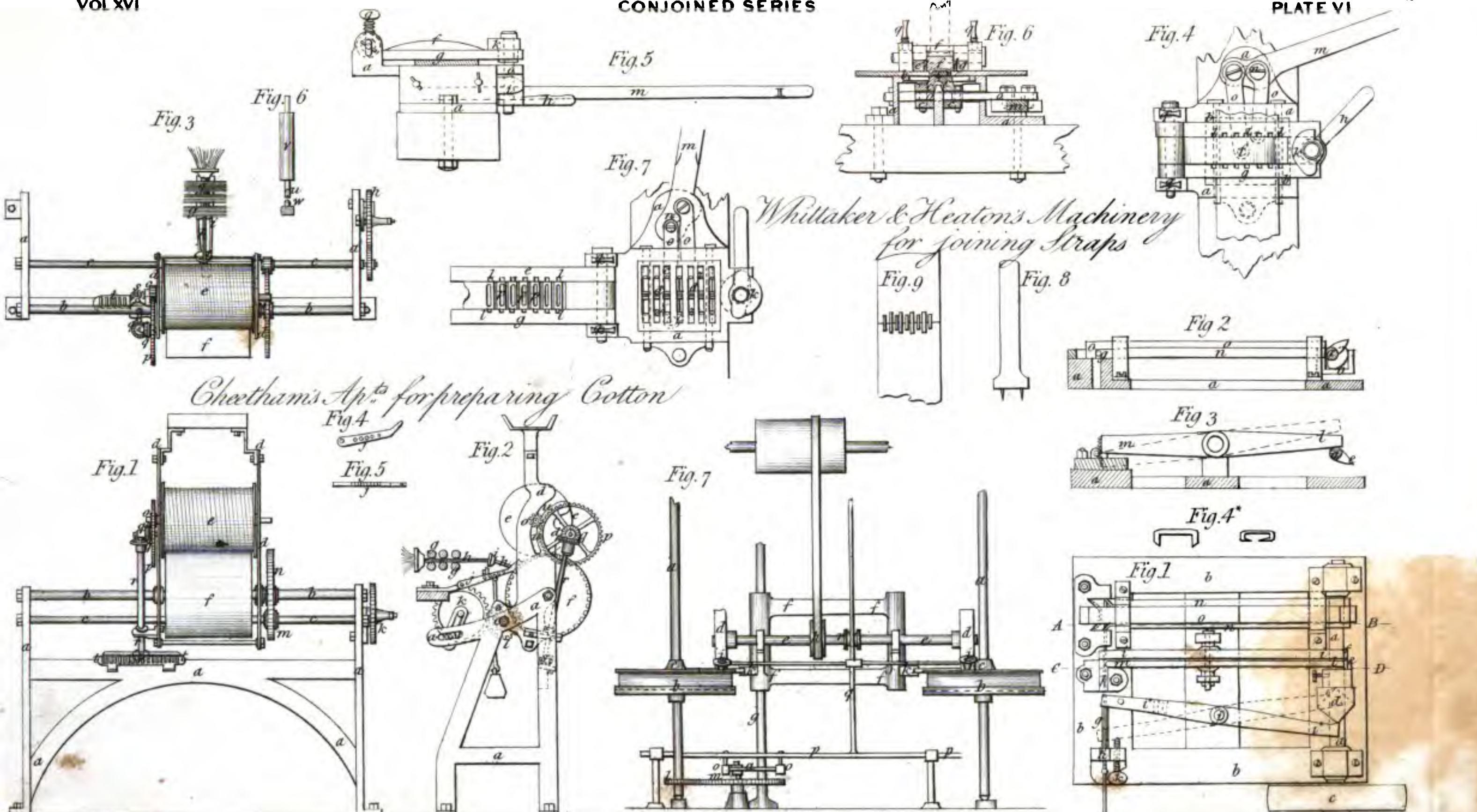
Wright's Machinery for making Chains

Lee's Impt. in Spinning

Read's Pump



W. Newton Delt. 1st April 1840. T. Sherratt Sc.



W. Newton Delt.

1st April 1840.

C. J. Malby Sculpt.

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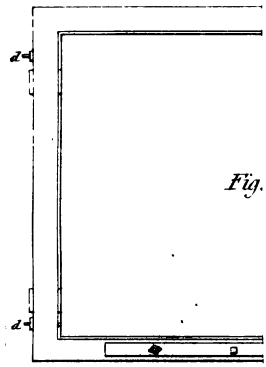


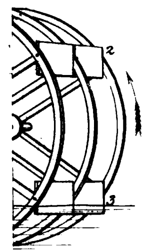
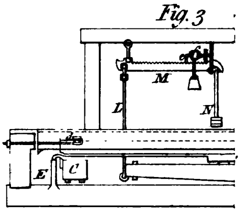
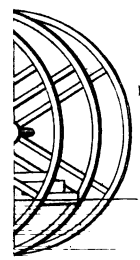
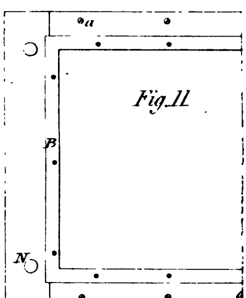


Fig. 3







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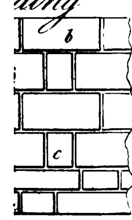


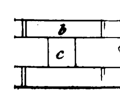
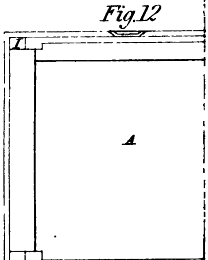
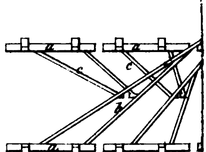
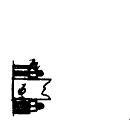


Fig. 12



h Building

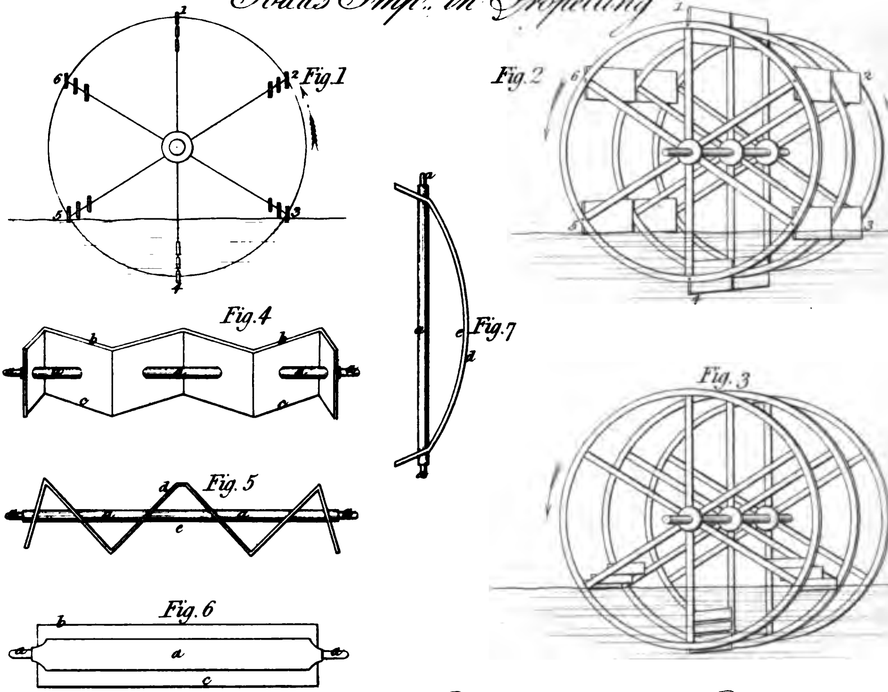




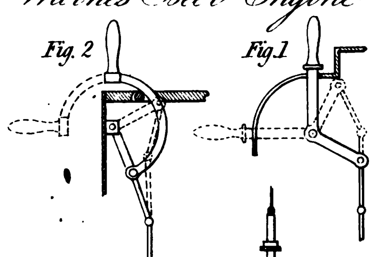
W. Newton Del.t

Sherratt Sc.

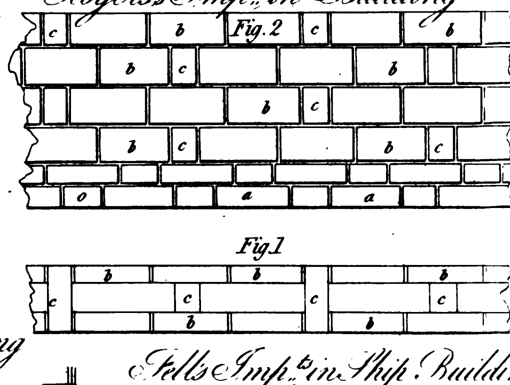
Todd's Impts. in Propelling



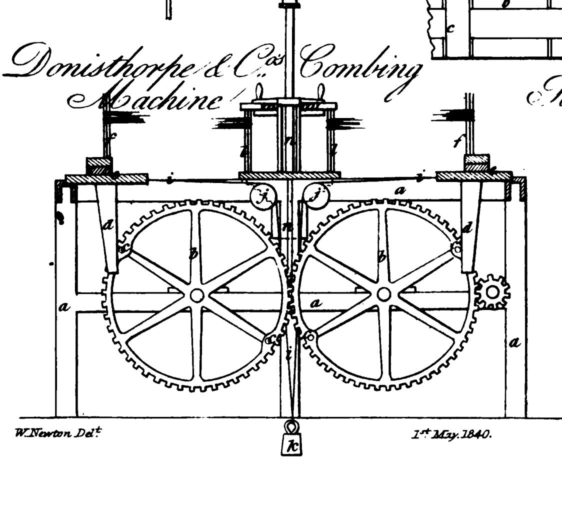
Warne's Beer Engine



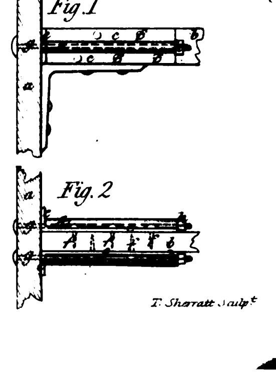
Rogers's Impts. in Building



Donisthorpe & Co.'s Combing Machine

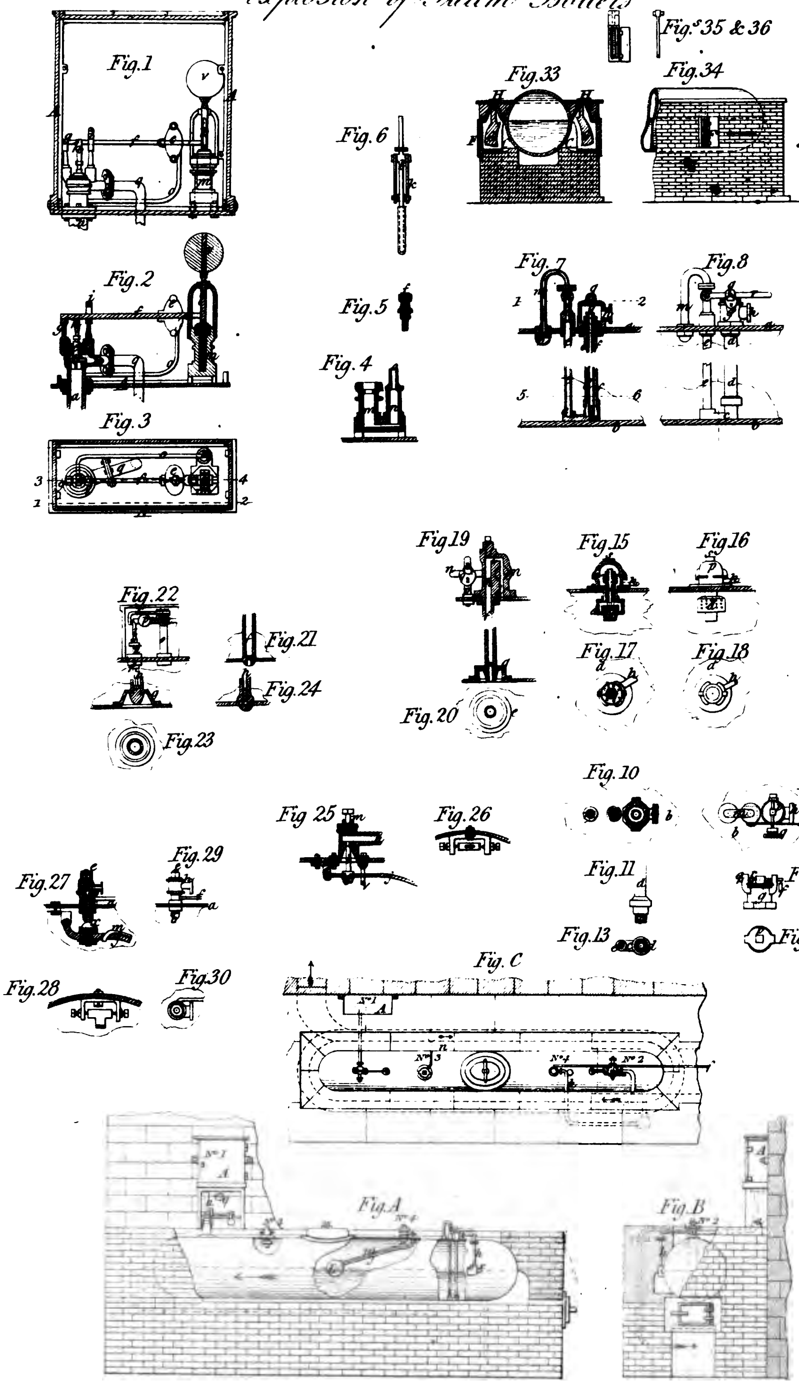


Fell's Impts. in Ship Building



W. Newton Del.t 1st May. 1840. T. Sherratt Sculp.t

Devaux's Apparatus for preventing the explosion of Steam Boilers



W. Newton Delt

1st June 1840.

F. Mansell Sculpt

Chappe's Imp.ts in consuming Smoke

Fig. 1 Fig. 3

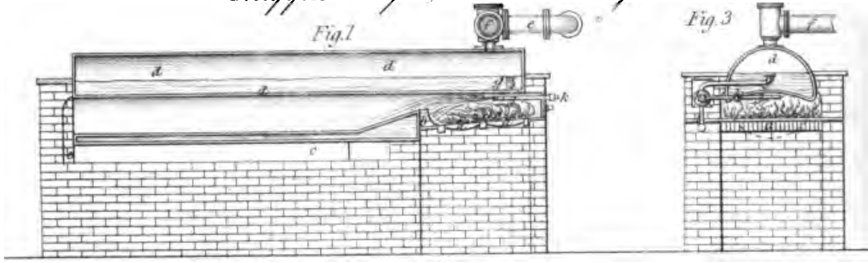


Fig. 2

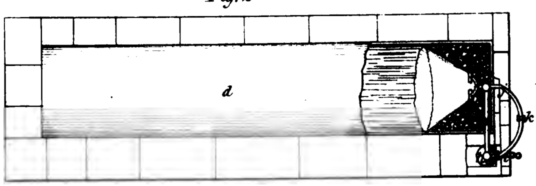
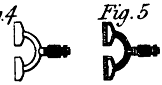


Fig. 4 Fig. 5



Doe's Improved Soap Frame

Fig 1 Fig. 2 Fig. 3

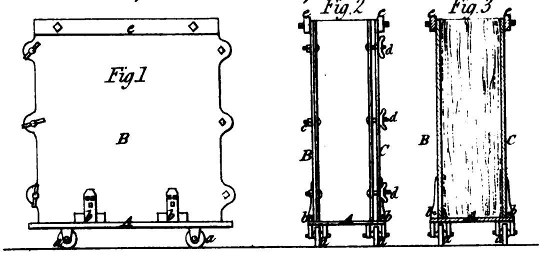


Fig. 5

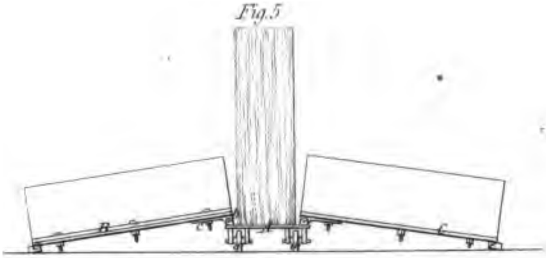
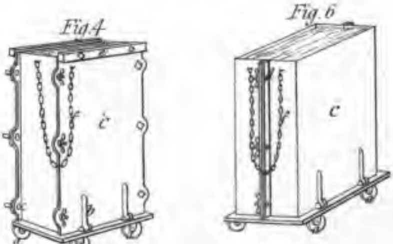
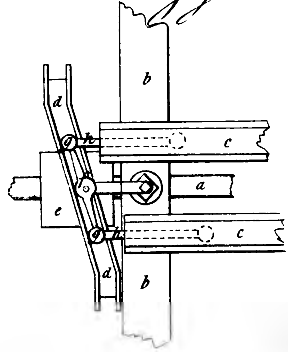


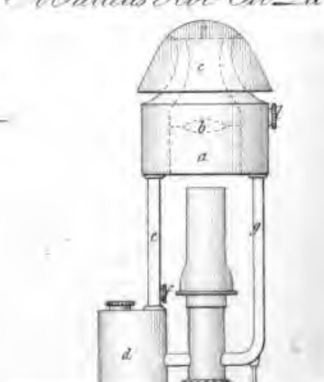
Fig. 4 Fig. 6



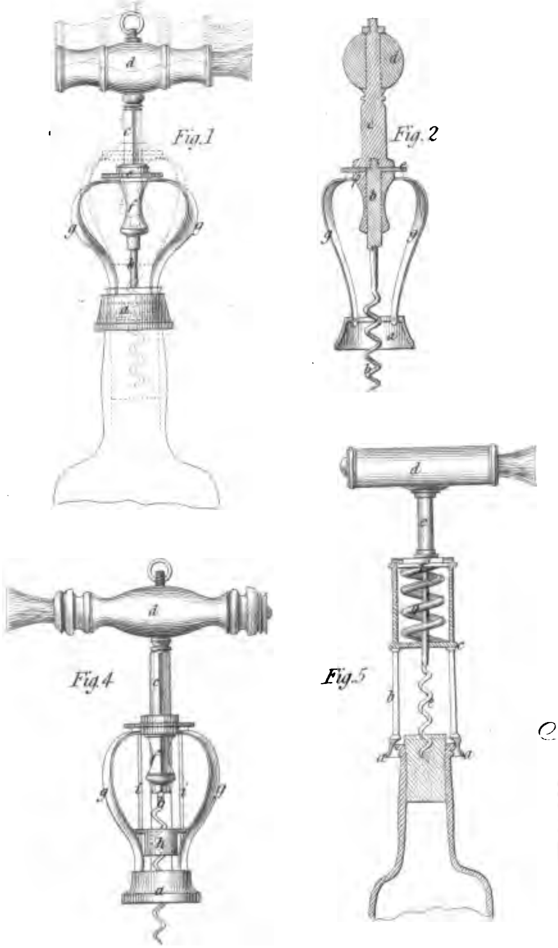
Haden's Gig Mill

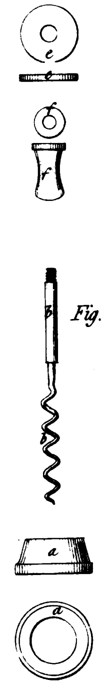


Mallett's Hot Oil Lamp

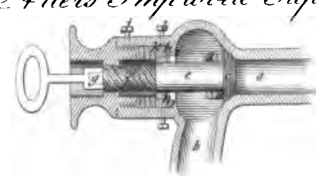


Osborne's Corkscrews

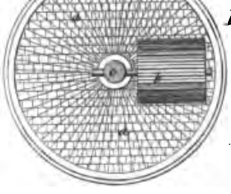


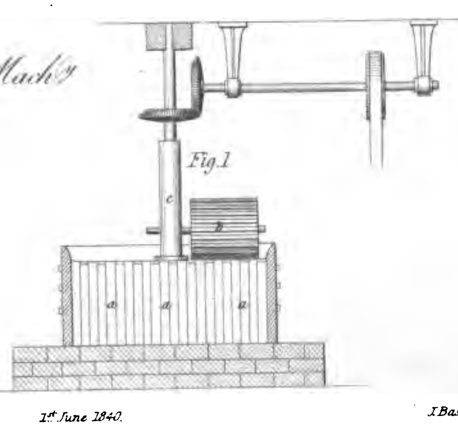


Arter's Improved Tap

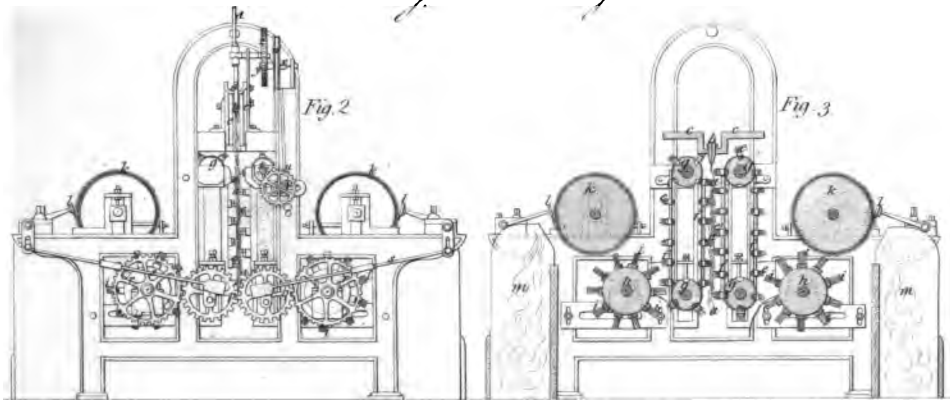


Watson's Flax Crushing Mach^y

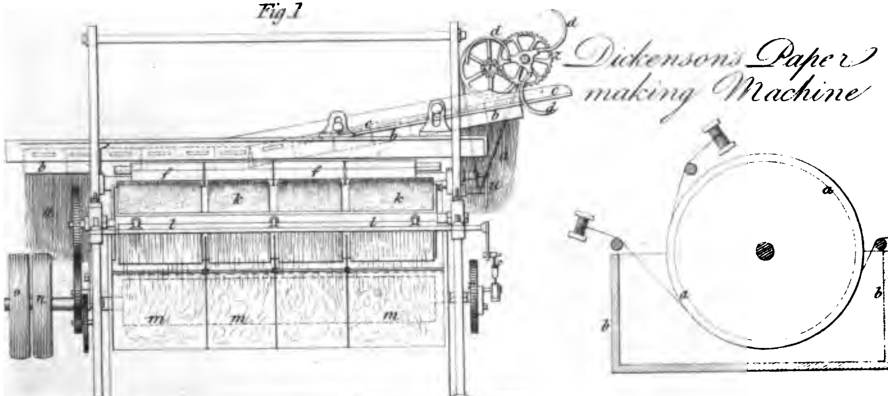




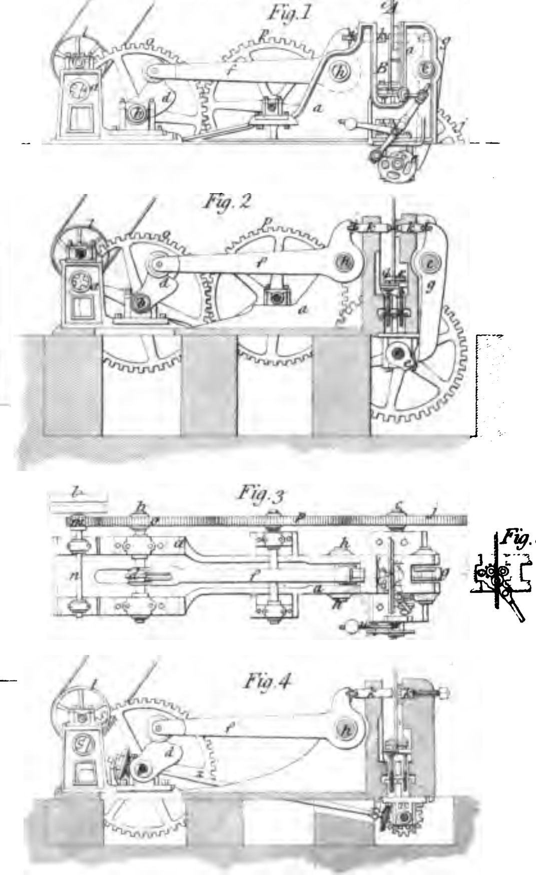
Wordsworth's Heckling Machinery



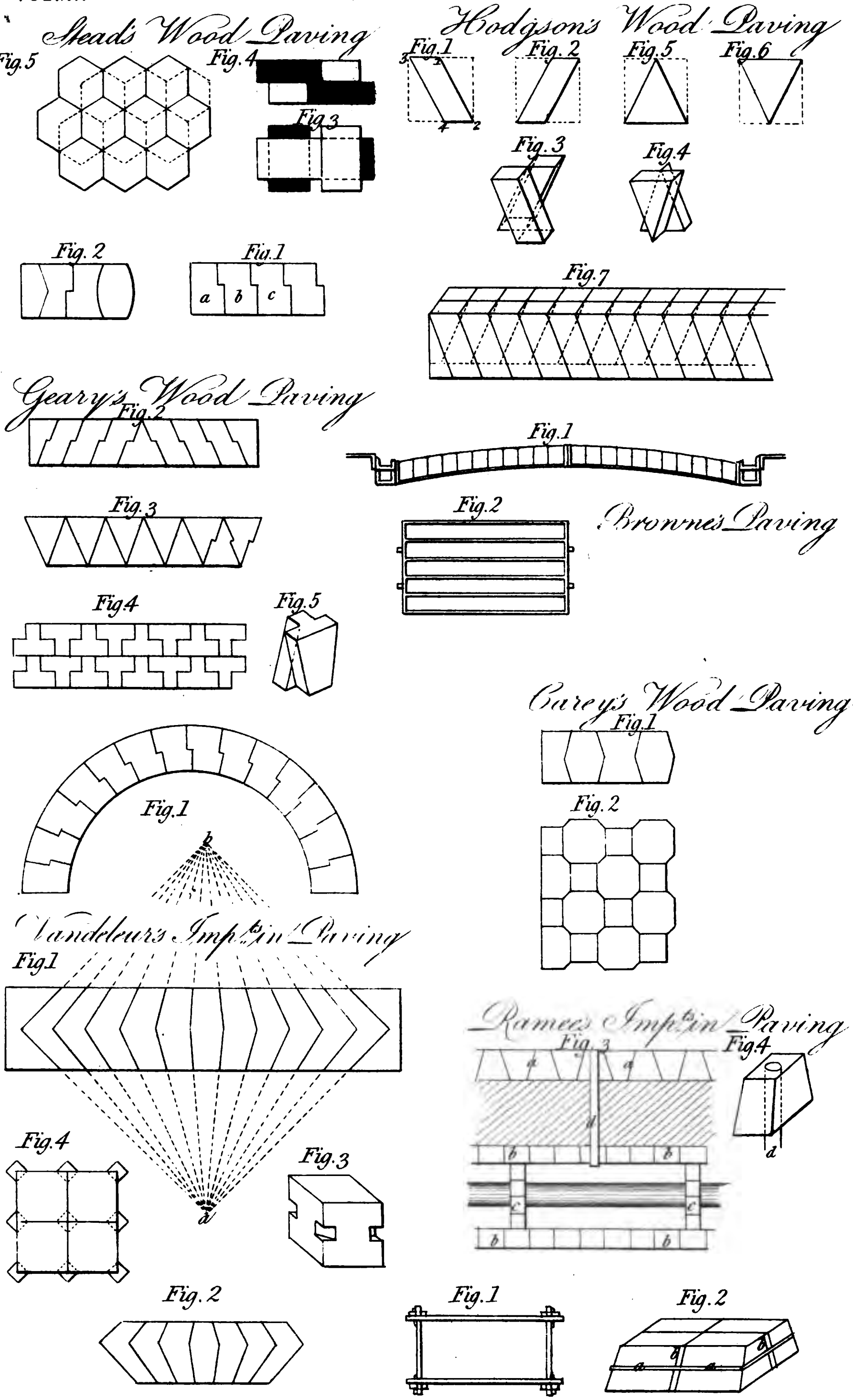
Dickenson's Paper making Machine



Smith's Rivetting Mach.ⁿ

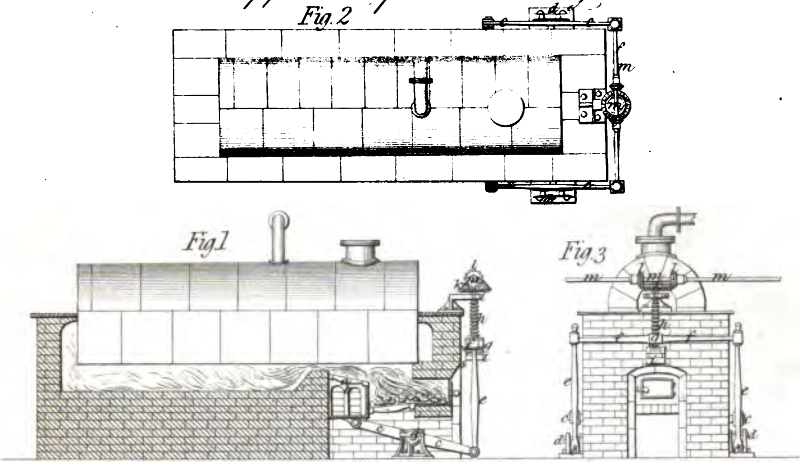


W. Newton Delin. 1st July 184[illegible] F. Mansell Sculp.t

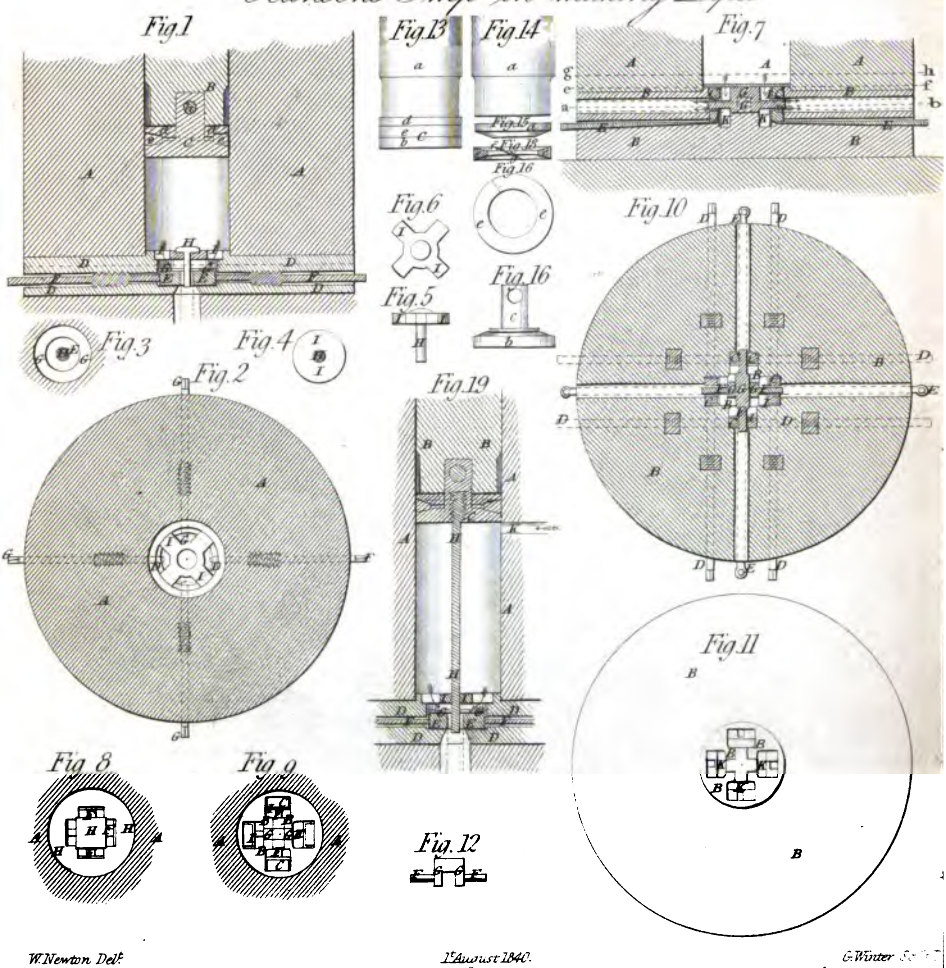


W. Newton Delin. 1st July 1840. A. V. Newton Sculpt.

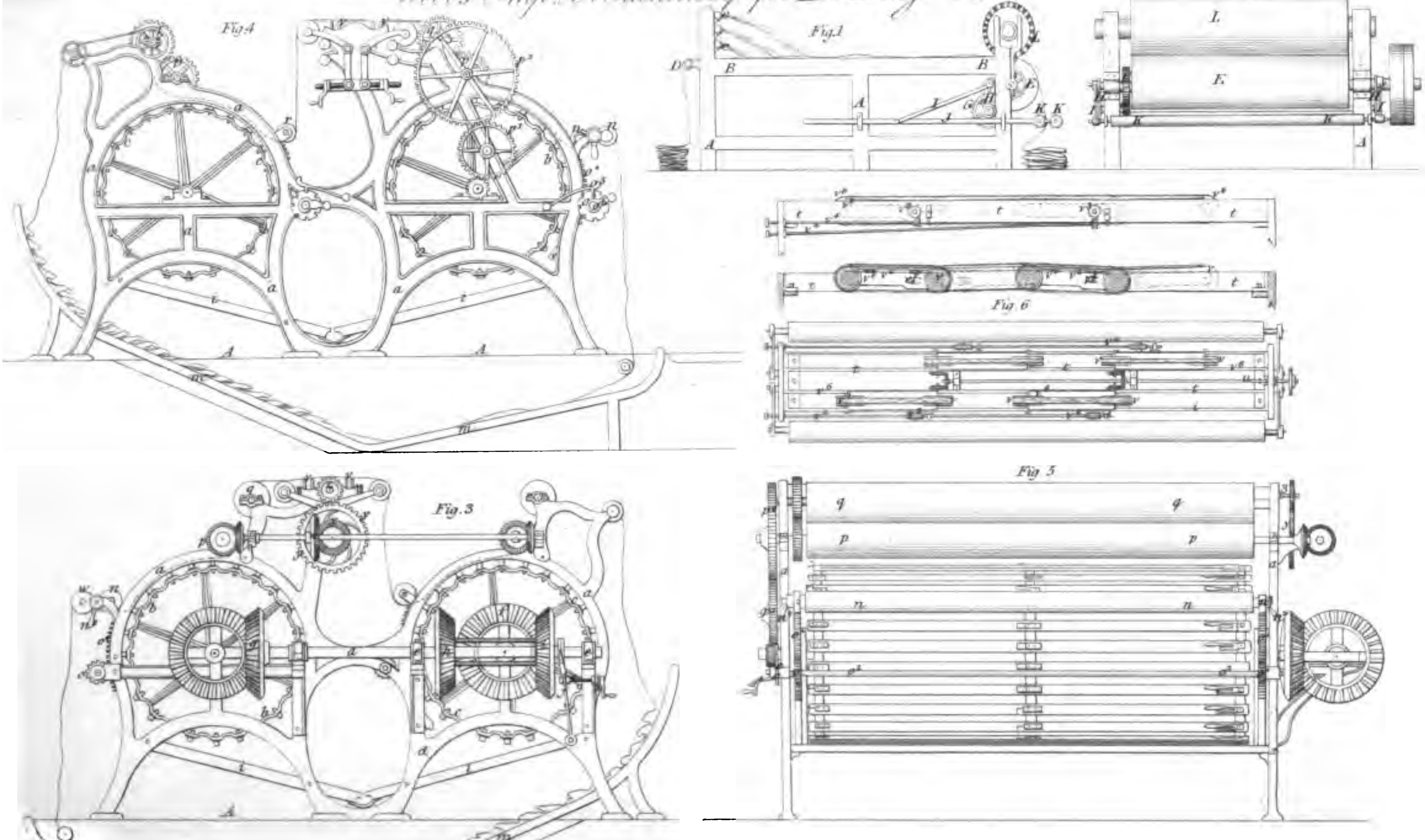
Dren's Apparatus for consuming Smoke



Hanson's Impts in making Pipes

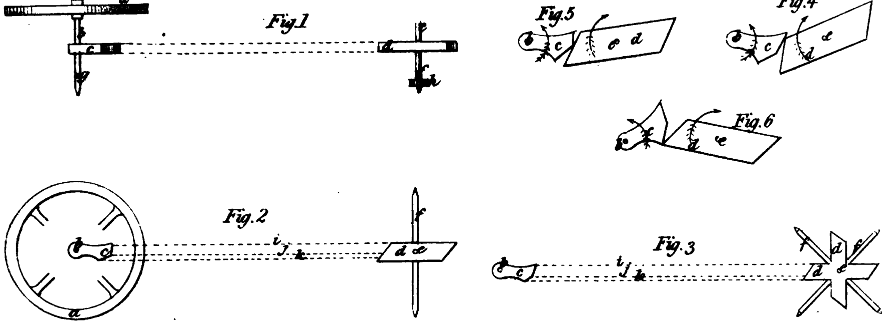


Webb's Impd. Machinery for Dressing Cloth

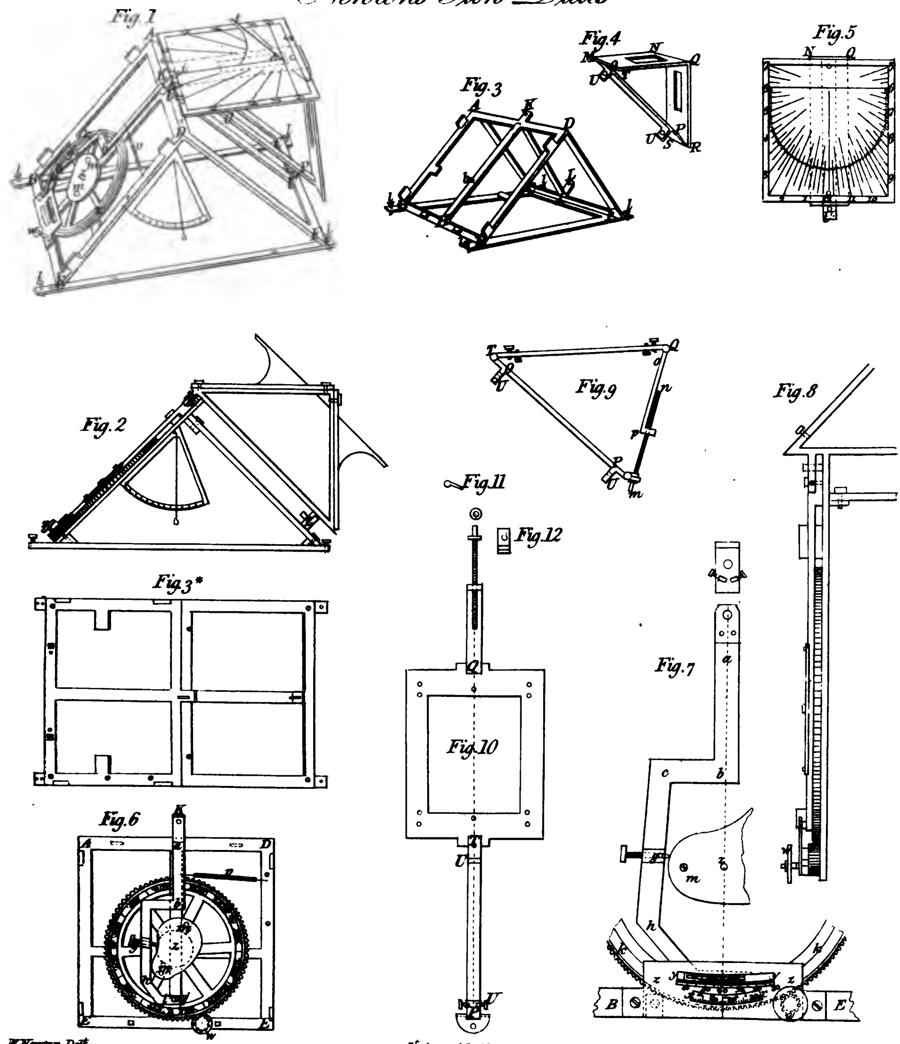


W. Newton Delt. 1st August 1840 F. Mansell Sculpt.

Philcox's Chronometer



Newton's Sun Dials



W. Newton Delt. 1st August 1840. S. Basire Sculpt.